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**Abul Barkat**

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**Bangladesh Economic Association**

4/C, Eskaton Garden Road, Dhaka-1000

Phone : 9345996, Fax : 880-2-9345996

E-mail : [bea.dhaka@gmail.com](mailto:bea.dhaka@gmail.com)

Website : [www.bea-bd.org](http://www.bea-bd.org)

# বাংলাদেশ জার্নাল অব পলিটিক্যাল ইকনমি

চৌত্রিশ খণ্ড, সংখ্যা ২, ডিসেম্বর ২০১৮

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# Bangladesh Journal of Political Economy

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## **Editor's Note**

Bangladesh Journal of Political Economy (BJPE) is an outcome of painstaking effort of Bangladesh Economic Association (BEA). This volume (34, No. 2, December 2018) contains articles that combines astute theoretical arguments with a firm grip on empirical situations, including institutional possibilities and limitations. Covering a diverse landscape ranging from digital development, effectiveness of monetary policy, climate change, green financing, entrepreneur and non-entrepreneur indigenous women, investment in infrastructure, poverty and inequality, this volume also considers many other vibrant issues and raises important questions to help set the programmes and policies for future Bangladesh.

It must be clearly admitted that along with inequality and deprivation, multidimensional poverty is still a major challenge for Bangladesh. This volume stresses and helps us to cogitate that true and inclusive development is not the outcome of a single factor, but is favored by a combination of elements, including the improvement of physical, human and social capital, the reduction of inequality and the establishment of institutions enabling the information flow essential to market performance.

This volume has been made possible through valuable contributions received from a good number of inquisitive and bright authors. I hope, this volume will be useful to policy makers and development practitioners as well as researchers and professionals who are committed for development. In time to come, BEA aspires to see this publication as an international scholarly journal, which seeks to publish more innovative and outstanding theoretical, textual and empirical research. BEA promotes inquiry particularly on contemporary issues within wider socio-political, economic and ethical context and provides a forum for the lively and critical discussion of theoretical and practical insights emerging from such inquiry. It encourages exploration and critical evaluation of new ideas. Furthermore, Bangladesh Journal of Political Economy particularly welcomes articles that advance our understanding

of development phenomenon across different local, regional and national contexts.

Finally, I feel honor-bound to convey my heart-felt thanks and deep sense of gratitude to the respected authors, reviewers and Editorial Advisory Board for their contribution in the publication of this issue. Thanks to the Editorial Board of the Journal, especially to Prof. Subhash Kumar Sengupta (member of Editorial Board) for devoting his time to ensure high standard of BJPE. Our unfeigned efforts will be more spawning provided the papers published in this issue prove to be useful to the passionate and careful readers. It is noteworthy that papers included in this volume were reviewed by both internal and external reviewers and concurred by the Editorial Board for publication. We appreciate constructive criticism and resounding feedback for further improvement of the Journal.

BEA always respects peoples' voice, their fundamental human rights, blooming hopes and aspirations and strongly protests against skewed distribution of income and uneven growth.



Abul Barkat, *Ph.D.*

President, Bangladesh Economic Association

Editor, Bangladesh Journal of Political Economy

বাংলাদেশ অর্থনীতি সমিতির যান্মাসিক জার্নাল  
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- ১। অর্থনীতির বিভিন্ন শাখায় তাত্ত্বিক এবং প্রায়োগিক বিষয়ে প্রবন্ধ প্রণয়নের জন্য প্রবন্ধকারদেরকে অনুরোধ জানানো হবে। ইংরেজী এবং বাংলা উভয় ভাষায় রচিত প্রবন্ধ জার্নালের জন্য গ্রহণ করা হবে।
- ২। Initial screening নির্বাহী সম্পাদকের এখতিয়ারভুক্ত থাকবে, তবে প্রয়োজনবোধে সম্পাদনা পরিষদের অন্য সদস্যদের সহায়তা তিনি নেবেন। নির্ধারিত format মোতাবেক সংশোধনের জন্য এই পর্যায়ে প্রাথমিকভাবে short-listed প্রবন্ধসমূহ প্রবন্ধকারের কাছে প্রেরণ করা হবে।
- ৩। অভ্যন্তরীণ reviewer সাধারণত সম্পাদনা পরিষদের সদস্যদের মধ্য থেকেই মনোনীত হবেন। বহিঃস্থ reviewer সম্পাদনা পরিষদের সিদ্ধান্তক্রমে প্রবন্ধের বিষয়ের ভিত্তিতে সম্পাদনা পরিষদের বাইরে থেকে মনোনীত হবেন, তবে তিনি দেশের অভ্যন্তরে বা বিদেশে অবস্থান করতে পারেন। সম্পাদনা উপদেষ্টা কমিটির সকল সদস্য reviewer হতে পারবেন। তৃতীয় reviewer প্রয়োজন হলে সম্পাদনা পরিষদের বাইরে থেকে মনোনীত করা হবে।
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- ৮। ক) তিনটি কোটেশন সংগ্রহ করে সম্পাদনা পরিষদের সিদ্ধান্তক্রমে মুদ্রক প্রতিষ্ঠান নির্বাচন করা হবে।  
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## Digital Development for Bangladesh: Challenges and Prospects

HAIDER A. KHAN\*

**Abstract:** *How can we make Digital Bangladesh a reality by building on the gains our country has already made under the current leadership?*

*In the fast developing digital technological revolution even the newly industrialized economies (the NIEs) have found it hard to catch up and maintain the pace required for not falling behind. The so-called developing economies are clearly at a great disadvantage in such a fast paced technological race. Thus there is a digital divide that is growing and through a cumulative causation the gap will widen further unless coordinated action is taken. Although not always stated in clear analytical terms, the astute steps Bangladesh policy makers are taking generally head in the right direction. But is there a way to be more focused and exploit the synergies in the economic and social system among various sectors to accelerate the process and minimize the cost of some inevitable failures as part of pursuing this appropriate but challenging goal?*

*This paper discusses some of the most important economic issues conceptually and offers some modest policy advice. The basic problem of adoption of a new technology system such as the ICT (information and communications technologies) is explored via the Schumpeterian concept of creative destruction in a nonlinear, path-dependent world. By investing strategically in physical, intellectual and other forms of human capital economies may be able to forge a path not only in the ICT sectors, but also create innovation systems of their own.*

*Indeed, the creation of a Bangladesh National Innovation System with ICT(BNIS-ICT) as an important component can be hastened through*

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\* John Evans Distinguished University Professor; Professor of Economics, University of Denver, Josef Korbel School of International Studies, Denver, Colorado, U.S.A.

*appropriate policies. Under the emerging globally competitive market environment this will be the best way to compete dynamically. However, creating comparative advantage in this way requires capabilities that many developing countries including Bangladesh lack at the moment. Creative policy interventions with a mix of market promotion, good governance, relative openness, and promotion of sustainable development in an equitable manner are necessary if the developing economies are not to be left far behind. The technical tools I propose are ways of enhancing scientific evidence-based policy making for Bangladesh.*

*Ultimately, Bangladesh can play an even more important role through its participation in various Augmented Regional Innovation Systems with ICT (ARIS-ICT). The development of BNIS-ICT and appropriate ARIS-ICT are goals that the Bangladesh government can and should pursue at the highest level by recruiting talent from all over the world, particularly competent Bangladeshi expatriates, and building productive and cost-effective institutions of Public Private Partnership (PPP). Towards this end, the largely successful examples of South Korea and Taiwan can be studied in detail and applicable lessons learned. By ensuring that the rural population as well as urban small businesses and ordinary citizens are well-served along with strategic sectors, Bangladesh can have both an efficient and equitable innovation system.*

## **1. Introduction**

The digital age has been heralded with great fanfare. However, if hyperboles are set aside and a sober assessment is made, we find the beginnings of a technological revolution that has already created much uncertainty and a huge amount of personal wealth and inter-group and households inequality. So far the benefits have also been largely confined to the developed countries. Even the newly industrialized economies (the NIEs) have found it hard to catch up and maintain the pace required for not falling behind. The so-called developing economies are clearly at a great disadvantage in such a fast paced technological race. Thus there is a digital divide that is growing and through a cumulative causation the gap will widen further unless coordinated action is taken. How can we make Digital Bangladesh a reality by building on the gains our country has already made under the current leadership?

This paper will discuss some of the most important economic issues conceptually and offer some modest policy advice. The field is vast and the issues are complex. Therefore, even this modest agenda may be too ambitious for a short paper.

More specifically, in the next section, the basic problem of adoption of a new technology system such as the ICT (information and communications technologies) is explored via the Schumpeterian concept of creative destruction. Section 3 sketches out the links between the ICT sectors, innovation, growth and development. Section 4 briefly outlines some special economic features related to the ICTs. Most important among these are the increasing returns to scale, network externalities and a disequilibrium process that can result in multiple possible equilibria at the end. Section 5 is the most substantive part of the paper. Here innovation as a positive feedback loop process is studied further, and a case study of such process is presented. The South Korean case study is a detailed investigation at both micro and macro levels of the requirements of an innovation system that can include ICTs as an integral part. The study leads towards a recognition of both the strengths and the limits of purely national efforts and suggests that a supranational institutional structure based on the principle of regional cooperation may be the optimal strategy for developing economies like Bangladesh.

## 2. ICTs and Creative Destruction

Writing in another era, Joseph Schumpeter seems to have been quite prescient in terms of describing the essence of what is happening globally today. In his book *Capitalism, Socialism and Democracy*, he averred:

The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, (This process) incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism.<sup>1</sup>

The ICT revolution in progress today is indeed a Schumpeterian process of creative destruction. The essence of capitalism in this view, is the constant revolutionizing of the economic structure from within. Marx had made a similar observation about the endogenous nature of technical change (Marx, 1867, 1945). Aghion and Howitt (1992) have proposed a model of creative destruction by treating the innovation process as intense inter-firm rivalry, as in the patent-race literature.

The present approach assumes, following Schumpeter, and Aghion and Howitt, that innovation in specific firms can have economy-wide effects. The expected

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<sup>1</sup> Schumpeter (1942)p.83

growth rate of the economy depends on the economy-wide amount of research; but the process of this growth, precisely because research leads to the development of new products and processes, is characterized by creative destruction.

The relationship between R&D and growth is therefore both intimate and complex. An economy-wide model intending to capture this complex relationship will need to posit non-linearity and complex feedback rules (Khan 2002, 2004, 2012, 2013, 2015). In the main body of this paper, no formal attempt is made to achieve this by endowing production functions and correspondences with some of these nonlinear and complex feedback features. However, it can be done—in particular, by defining non-linear production structures so that increasing returns and endogenous innovations are possible, one can explore the properties of fixed points that define equilibria at any point in time. A sequence of such equilibria over time, picked by an appropriate selection procedure, can then show the evolution of the system.<sup>2</sup> In the appendix, a prototype model is presented with two different existence proofs, first on a vector lattice, and then on the Banach space.

The problem of the developing countries in this ICT revolution is precisely that they face the destructive side of this process without being able to benefit necessarily from the creative side. The prospects for benefits exist but to realize them will require cooperation from the developed countries and domestic policy maneuvers. But what are these ICT sectors precisely?

### 3. ICT, Innovation, Growth and Development

Before discussing the relation between ICT sectors and economic growth, innovation and development, it is first necessary to have a clear definition of the ICT sectors. The most widely accepted definition so far is the one agreed to at the April 1998 meeting of the Working Party on Indicators for the Information Society (WPIIS) and subsequently endorsed at the September 1978 meeting of the Committee for Information, Computer and Communication Policy of OECD. The following principles underlie the definition.

For *manufacturing industries*, the products of a candidate industry:

- Must be intended to fulfill the function of information processing and communication including transmission and display.
- Must use electronic processing to detect, measure and/or record physical phenomena or to control a physical process.

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<sup>2</sup>. For an extended formal treatment, see Khan (1998) and Khan (2001a). Existence proofs for multiple equilibria are also given in these sources.



For *services industries*, the products of a candidate industry:

- Must be intended to enable the function of information processing and communication by electronic means.

Based on these principles the ICT sectors are identified within the revised classes of the International Standard Industrial Classification (ISIC). In manufacturing and services the following four digit sectors are included:

#### *Manufacturing*

- 3000-Office, accounting and computing machinery
- 3130-Insulated wire and cable
- 3210-Electronic valves and tubes and other electronic components
- 3220-television and radio transmitters and apparatus for line telephony and line telegraphy
- 3230-Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
- 3312-Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment
- 3313-Industrial process control equipment

#### *Services*

- 5150-Wholesaling of machinery, equipment and supplies
- 7123-Renting of office machinery and equipment (including computers)
- 6420-telecommunications
- 7200-Computer and related activities

In short, roughly there are three broad categories of the new ICTs: (1) computing (2) communicating (3) Internet-enabled communication and computing.

Strictly speaking, not all of ICT sectors are digital, or at least not yet. Even within the digital part, the pre- and post- internet distinction is historically important and relevant for the developing economies, as Tschang(2000) points out.

We can roughly dissect the digital economy's infrastructure into its pre-Internet and Internet eras. Before the Internet, a host of information technologies came into existence, which provided computing power on a platform-specific system, usually centralized (e.g. a central mainframe with terminals) or distributed within a local area. The advent of the Internet (and its precursors, the U.S. government-funded research networks like the defense research network - ARPANET) was a critical event because it set up the basic infrastructure, standards (e.g. protocols for communication) and technologies that enabled large scale, distributed and

platform-independent information exchange and manipulation. This “single” system allowed the introduction of literally unlimited sources of information, or access points to it, in a *scalable* fashion, i.e., without increasing numbers of constraints or decreasing economic “returns to scale”.

The first computing functions consisted of basic email and file transfer capabilities like *ftp* and *gopher*, but these were soon coupled with basic “Web” technologies, like the development of the first browsers and the standards and technologies of the “World Wide Web”. This latter further improved the remote accessing and manipulation of information, and ensured that all information could be “web-based”, and therefore potentially viewable/downloadable by anyone connected to the Web. All these set the stage for electronic commerce to take place, since the connection of such large numbers of people to all the sources of information provided a potential market never possible in the history of markets.

Today, the developing countries like Bangladesh may be able to leapfrog, as Soete (1985) had earlier conjectured for microelectronics; but there is a real danger of just lagging behind. The situation can be summarized by simply looking at the state of e-commerce infrastructure. OECD (1999) offers a classification of the infrastructure sectors for e-commerce: (1) hardware (PCs, routers, servers etc.), (2) software to run the hardware and e-commerce packages, (3) network service providers (e.g. providing Internet access), and (4) enabling services (e.g. e-payment, authentication/certification services, advertising and delivery). The revenue for these four categories were estimated for an early stage (I will call this stage 1) as follows:

Table 1: Value of E-commerce (billions of U.S. dollars)

	1995-97	2000-02
Hardware	11-30	43-72
Software and computer services	0.9	3.8-5.1
Network service providers	0.3-6.3	5-46.4
Enabling services	0.5-1	7.6-10
<b>E-commerce</b>		
Total e-commerce (median of multiple studies)	0.7	155
Business-to-business e-commerce (average over various years: 1996-2002)	78	

Source: Tschang (2000); OECD (1999)

Although detailed information is not readily available, I have estimated that in the next stage (Khan 2012), the numbers grew by double digit rates for key players in East Asia and later (in Stage 3) for India. The state of the developing economies

in stage 1 is underlined by the fact that this table does not even include them as a category via a breakdown into developed and developing economies. One reason why this idea may not even have crossed the minds of the OECD volume authors is that even if the suggested breakdown were to be carried out, the percentage share within each category (in table 1 above) for the developing economies would have been less than one per cent. Along the key dimensions of a digital economy such as computers per capita, internet providers, telecommunications infrastructure and cellular telephony etc. also the developing countries are far behind the developed ones.

Even advanced developing countries, i.e., NIEs and other large economies such as the Asian tigers, China, India, Brazil or Mexico are in danger of falling further behind. What can explain this tendency and how best can the developing countries like Bangladesh catch up? A conceptual clarification of the basic economics involved will help guide policy discussions in this area. It is to this task that the rest of the paper is devoted. It will be clear that though Bangladesh is now between stage 1 and 2, there is a possibility through coordinated policy and PPP to proceed to a stage 3 BNIS-ICT and then to a stage 4 ARIS-ICT in South and Southeast Asian regional networks.

#### **4. The (not entirely) New Economics of ICT and Knowledge Sectors**

The key to understanding the economics of ICT and knowledge sectors is to realize that a disequilibrium process has set in within the world economy and the advanced countries of the world that is leading to rapid economic changes. These changes include intersectoral shifts toward the ICT and knowledge sectors, changing skill requirements, high volatility of wages, profits and financial variables and consequent increase in uncertainty about the future states of the economy. The dynamics of this disequilibrium process must be studied through methods of understanding complexity. Clearly, our knowledge of such dynamic systems is still in its infancy; but much can be learned by studying some known features.

In the last twenty years, the frontiers of economics have moved far beyond the standard models of decreasing or constant returns where costs cannot be decreased beyond a certain point, unless factor markets behave in a peculiarly decreasing marginal cost fashion. Leaving the perfectly competitive world behind, economists at the frontiers have been focusing on increasing returns to scale, economies of scope and network externalities.<sup>3</sup>

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<sup>3</sup>. Among the sources cited in the references see in particular, Arthur (1994), Matsuyama (1991), Khan (1998, Khan 2002, 2004, 2012, 2013, 2015) among others.

The world of high technology in general and the ICT and knowledge sectors in particular, are characterized much better through these approaches than the old perfectly competitive models. Many models of imperfect competition have also been developed to study interesting and relevant phenomena such as R&D rivalry and R&D expenditures. The upshot of these developments is that economists at the frontiers of their discipline are much closer to understanding many aspects of the digital economy than they were ten years ago. In this paper I want to illustrate this point by discussing informally a recently developed theoretical and modeling approach. The policy implications for the ICT and knowledge sectors of developing countries are quite striking.

### **5. Positive Feedback Loops, Innovation and Intellectual Property Rights in Developing Countries**

The concept of NIS or National Innovation System, like many other concepts in the field of economics of innovation was originally proposed for analyzing developed technological systems in the advanced industrial countries (Freeman:1987;Nelson: 1993;Anderson and Lundvall: 1992;). As a systems-oriented, holistic way of thinking about technological change it has undoubted strengths. By drawing the link between R&D, human resources development, formal education and training as well as innovating firms,

NIS presents an analytical schema for relating a cross cutting array of activities that lead to a dynamic innovative economy. The proponents of this approach also advocate an 'evolutionary' as opposed to a mechanistic approach based on classical physics type study of equilibria for studying the economics of innovation.

Given the obviously sincere and serious intentions of the theorists of NIS and the intellectual break with neoclassical economics, the study of NIS held out promises of both retrospective understanding of economic history and a prospective, prescriptive approach to help countries innovate. Nowhere was this promise more eagerly believed than in the developing countries. No one was more excited by the prospects of NIS than the avid modernizers in the governments, universities and international organizations and think tanks. I have documented in great detail elsewhere (Khan, 1997; 1998; forthcoming) the reach and sweep of NIS in newly industrializing countries such as South Korea and Taiwan.

Yet, so far the thinking about NIS, and its connections to modernity and development have been entirely technocratic. The argument always proceeds in terms of the function of technologies and their role in increasing GDP/capita in

the most efficient manner. The intense and inconclusive debate raging with respect to whether East Asia has really grown because of a simple accumulation of labor and capital or because of productivity increase through genuine technical progress and learning illustrates neatly this technocratic bias. Neither side is willing to step beyond the economic inputs and outputs, production functions and technology as a black box. It is, of course, important to know whether learning has taken place in, for instance, textiles or electronics sectors. But there is no recognition of the point made by Feenberg and others, namely that "...design responds not only to the social meaning of individual technical objects, but also incorporates broader dimensions about social values" (Feenberg 1999, p. 86).

This "cultural horizon" of NIS which legitimately can be said to constitute a hermeneutic, interpretive dimension, should offer some interpretative flexibility. A recent paper by Murata (1999) illustrates the relevance and importance of such interpretative flexibility by simple but elegant examples such as the go-slow street barriers (to restrict speed) and harnessing the driver of a car to the key to prevent her from leaving it in the car in a fit of forgetfulness. When an underdeveloped economy accepts an NIS whose components come from abroad, a society-wide hermeneutic process is unleashed. Yet this is where the interpretative flexibility is frequently blocked by the closure imposed undemocratically over the rest of the population by the technocratic elite and their modernizing allies from the outside.

Such premature closures can certainly produce success stories. In Taiwan, for example, NIS has succeeded to the extent that it has been able to capture market shares in various high technology areas. The swift capture by the Taiwanese manufacturers the lion's shares of world information technology hardware markets is nothing short of amazing. In most relevant product categories Taiwan has more than 50 percent of market share. In some categories such as scanners it has almost cornered the whole market.

Yet further progress requires both a deeper understanding of the disequilibrium processes at work leading towards multiple equilibria, and the social-cultural implications of the complex economics of **the production and distribution** aspects of NIS. It is with a view towards capturing these complexities leading towards multiple equilibria that an alternative conceptualization of technology systems transition has been formulated by some economists (Khan 1993; James and Khan 1997; Khan 1998, 2001a, b).

In addition to capturing equilibrium and disequilibrium features of technological transitions, this broad approach can illuminate distributional issues as well. Since poverty alleviation remains on the agenda of the national governments of

developing countries and the international development agencies, it can be argued that from this perspective at least the new approach has obvious relevance for the developing countries.

Khan(1998, 2001a) has formalized this approach and has coined the abbreviation POLIS to emphasize both the disequilibrium positive feedback loop features and the politico-social dimensions of the technological transitions. For the current ICT transitions in developing countries this model has been applied to South Korea, Taiwan, China and India, with work underway for Indonesia. The key results for policy purposes will be described shortly; but first let us take a closer look at the concept itself.

#### Complex Technological Systems and Models of POLIS in the National Context: Towards BNIS-ICT

It has been known for some time that technological systems are complex structures with many types of feedback loops and nonlinear relations. In this context, strategies of technological development assume new importance. As the debate on the “East Asian miracle” underlines, the key strategic question for a country that has made a technological transition from a traditional to a modern system concerns the prospects for long-term economic growth. Ultimately, it is the sustainable long-term rate of growth that will determine the wealth that can be distributed among personal consumption, investment, government spending on infrastructure and public services, etc.

Therefore, it is the creation of an innovation system that will determine the viability of a technology-based growth process. This process of building an innovation system is very much an evolutionary and path-dependent process.(Nelson 1981, 1989, 1993, 1994; Nelson and Winter 1974, 1977, 1982) The central idea is that the provision of appropriate types of capital, labor and forms of organization for high value-added industries will lead to rapid productivity increases. However, to sustain such an increase, a domestic innovation system must be set up. There is a further requirement that this innovation system must fulfill. This is the requirement of a positive feedback loop or a virtuous cycle of innovations.

This problem, as I have emphasized, is intimately connected with the existence of multiple equilibria in complex economies. A positive feedback loop leading to a virtuous cycle of growth and technology development is one particular sequence of equilibria in this context.<sup>4</sup> In general, such a sequence also involves increasing

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<sup>4</sup>. If there is more than one such sequence, we may be tempted to choose from among them, the “optimal” sequence, according to some well-defined criterion, e.g., present value maximization.

returns. In the remainder of this section a theoretical exploration of innovation with increasing returns and multiple equilibria will be undertaken.

In a market economy, ‘success’ is often cumulative or self-reinforcing. Typically outcomes are not predictable in advance. However, once equilibrium gets selected out of a number of long-run equilibria, there is a tendency to be locked in. Technically, economic processes exhibit non-convexities — violating the generic assumption of competitive equilibrium economics. The presence of self-reinforcing mechanisms sharing common features found in fields as far apart as enzyme reactions and the economics of technical change underlines the importance of such mechanisms in governing the dynamics of self-reinforcing processes regardless of the field in which they occur.<sup>5</sup>

In order to give the reader some informal idea of the problem of formalizing complex technological systems I summarize here the basic structure of a ‘simple’ non-linear model embodying distinct technological systems. At any single point in time, the model can be presented as a Social Accounting Matrix (SAM) representation of the socio-economic system. The key distinction here is the explicitly non-linear nature of the economy-wide functional relationships. The key theorem shows the existence of multiple equilibria. Some further considerations lead to the specification of definite technology sectors such as the ICT sectors, productivity enhancement and income distribution.

Thus a closed loop feedback system including all the production and distribution mechanisms can be set to work. The attractiveness of such an approach to the proponents of a holistic perspective should be readily apparent. What is even more intriguing is that apparently a way has been found to move beyond the annoying vagueness of the proponents of the systems approach to a precise and even mathematically and statistically formal way of describing complex technology systems. I now move towards a brief description of the key results obtained so far for the ICT sectors and their policy implications in the context of Bangladesh.

### **ICT Sectors in a POLIS within BNIS-ICT and Policymaking in Developing Economies: What can Bangladesh Learn from South Korea (and Taiwan)?**

The empirical work done so far on the ICT sectors in the NIEs and some other developing economies reveals the presence and importance of increasing returns to scale, economies of scope, network externalities and strategic complementarity

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<sup>5</sup>. See the essays in Arthur (1994) for some illuminating discussions.

between R&D and human resource development. This line of work also reveals the problems of building a POLIS when many of its ingredients are either missing or are underdeveloped. The example of South Korea is illustrative and instructive.

Whatever the record in the 1960s and 1970s, by the 1980s Korea did enter a largely modern technology-centered era (Khan, 1997a). Therefore, we need to investigate the situation during the last decade and a half in order to see the source and role of this modern technology system. First, it is necessary to look at the transfer of technology from abroad to Korea. In the process we also will have an opportunity to examine Teitel's characterization of the three phases of technological development. According to Teitel (1984 a, b) the first phase is the acquisition of technology from abroad; the second phase involves the modification of borrowed technology. The final phase is the generation of technology at home. This acquisition-modification-creation process can be observed in the history of economic evolution of the advanced industrial countries.

*Table 2 : Changes in Technology Import Policy during the decade of creating the modern technology system since 1978 (1978- 1988)*

<b>Period</b>	<b>Contents</b>	<b>Industry</b>
First Step (April 1978)	- Automatic approval items: <ul style="list-style-type: none"> <li>• advance payment less than \$30,000, royalty rates less than 3%, license period less than 3 years</li> <li>• Total royalty less than \$100,000</li> </ul>	Machinery, shipbuilding, electrical goods, electronics, fabricated metal products, chemicals, textiles.
Second Step (April 1979)	- Automatic approval items: <ul style="list-style-type: none"> <li>• Advance payment less than \$50,000, royalty rate less than 10%, license period less than 10 years</li> </ul>	All industries, except nuclear energy and defense industry.
Third Step (July 1980)	- Automatic approval items: royalty rate less 10%, license period less than 10 years	All industries.
Fourth Step (September 1982)	- Delegation of approval authority to the competent ministry	All industries.
Fifth Step (July 1984)	- Transition from the approval system to a reporting system	All industries.
Sixth Step (July 1986)	- Transfer of trademarks only permitted	All industries.
Seventh Step (July 1988)	- Delegation of approval authority to Class A foreign exchange banks under the Foreign Exchange Control Act, except in cases where the license period exceeds 3 years and the total royalty exceeds \$100,000 or the royalty rate exceeds 2% (or initial payment exceeds \$50,000)	All industries.

Source: Korea Industrial Technology Association, Surveys on Technology Imports, 1992, p.9.



The government of Korea passed the Technology Development Promotion Act (TDPA) in 1972 the purpose of which was to facilitate technology imports. This coincided with the establishment of Technology Imports Counseling Center at the Korea Institute of Science and Technology. At the same time the Korea Development Bank's 'technology development fund' originated as a source of financing. The following year the TDPA was further liberalized to relax the approval criteria for imported technologies.

The third and fourth five-year economic development plans emphasized the role of heavy and chemical industries. A form of industrial policy can be seen to be at work here. Table 2 summarizes the changes in Technology import policy since 1978. The financial assistance facilities also played important roles. These are presented in table 3. Table 4 shows the declared industrialization and technology strategies during the decade of 1960s, 1970s and 1980s. It is important to note that promotion of high-tech industries became a goal only in the 1980s.

As Table 2 shows, changes in technology import policy since 1978 have become more liberal. The openness that existed with respect to trade in consumer goods can be said to have been extended to capital goods with embodied technology. Table 3 shows the general structure of the financial assistance system. Clearly, without such financing, technology imports would be hampered. These policies are consistent with the general development strategies by stages of development as shown in Table 4.

*Table 3: Financial Assistance System during the period of creating a high technology system*

Government Subsidy	Direct subsidy to private firms or industrial technology research association who participate in special R&D project or industrial basic technology development project for 40-80% of R&D fund.
Loan by Policy Fund	Annual 5.0-10.5% interest rate loan on R&D and commercialization of new technology.
General Loan	Loan assistance to R&D and commercialization of new technology by Korea Development Bank, Small-Medium Firm Bank, and other banks. The same interest rates as bank loans.
Assistance to Venture Capital	Korea General Technology Fund (Inc.)
Technology Credit Guarantee	Technology Credit Guarantee Fund

Source: KIET, Program for Technology Banking System Improvement, 1992.

It is interesting to note that as the Korean economy has grown it has progressively imported more technology. More than 75 per cent of all foreign technologies imported between 1962 and 1991 came from Japan and the U.S. Table 5 shows TI

*Table 4: Development strategies by stages of development for three decades leading to the creation of the high technology system*

Period	Direction of Industrialization	Technological development strategy
1960s	1. Establishment of the foundation for industrialization.	1. Expanding education in science and technology and training in skills.
	2. Fostering of import-substitution industries.	2. Establishment of the legal and institutional basis for the promotion of science and technology.
	3. Expansion of export-oriented light industries (mainly labor-intensive industries).	3. Facilitating the importation of advanced technologies.
1970s	4. Enhancing the sophistication of industries and fostering the heavy and chemical industries.	1. Upgrading technological and scientific training in priority areas.
	5. Promotion of small- and medium-sized industries.	2. Facilitating the adaptation and improvement of imported technologies through the establishment of research entities in private industries.
	6. Strengthening the competitiveness of industries in the international market.	3. Strengthening industrial technology research and development capability.
1980s	7. Enhancing the quality of export goods.	1. Providing the large-scale recruitment from abroad and training of highly qualified scientific and technological manpower.
	8. Promotion of skill-intensive industries (high-tech industries).	2. Liberalization of technology imports.
	9. Fostering of information industry	3. Preparation for an information-oriented society.

Source: Excerpted from Khan (1997a).

(technology imports), FDI (Foreign Direct Investment) and capital goods imports by Korea. The growth in imported technology and capital goods is noticeable throughout the 1980s.

The adoption and diffusion of technology (imported or otherwise acquired), inevitably requires various lengths of time. On the demand side, the profitability of imported technology must be a major factor. However direct measures are impossible to get. A proxy that follows the strategy of Khan (1997a) is obtained by considering the profitability of the large and medium sized enterprises which are assumed to use imported technology. Adaptabilities of technologies also matter. The extent to which imported technologies can be adapted to domestic needs and circumstances also depends mainly on the technological capabilities of the host firms. Here, too, the large and medium-sized enterprises will generally have a better chance of adapting the foreign technology.

It is possible to collect the relevant information and to organize this information in an economy wide technology systems matrix (technically called SAM-TECH) format. Looking at the information organized as a SAM-TECH as well as closely

Table 5: TI, FDI, and Capital Goods Imports: 1962-91(up to the creation of high technology system)

Year	TI payment (A, \$million)	TI case	FDI (B, \$ million)	FDI case (%)	A/B (%)	Capital Goods Imports (C, \$million)	C/total imports (%)
62-66	0.8	33	47.4	39	1.7	486.0	18.9
67-71	20.4	285	218.6	350	9.3	2668.0	30.8
72-76	96.5	434	879.4	851	11.0	8106.0	27.3
77	58.1	168	83.6	54	69.5	3008.1	27.8
78	85.1	297	149.4	51	57.0	5080.3	33.9
79	93.9	291	191.3	55	49.1	6314.0	31.0
80	107.2	222	143.1	40	74.9	5125.0	23.0
81	107.1	247	153.1	44	70.0	6158.2	23.6
82	115.7	308	189.0	56	61.2	6232.7	25.7
83	149.5	362	269.4	75	55.5	7814.7	29.8
84	213.2	437	422.3	104	50.5	10106.3	33.0
85	295.5	454	532.1	127	55.4	11078.9	35.6
86	411.0	517	354.7	203	115.9	11340.2	35.9
87	523.7	637	1063.3	362	49.3	14552.4	35.5
88	676.3	751	1282.7	342	52.7	19033.4	36.7
89	888.6	763	1090.2	336	81.5	22370.3	36.4
90	1087.0	738	802.5	296	135.5	25451.3	36.4
91	1183.8	592	1396.0	287	84.8	30092.0	36.9
total	6109.3	7526	9268.8	3672	65.9	195016.0	33.3
ratio (%)	(3.1)			(4.8)		(100)	

Approval basis.

Sources: Korea Industrial Technology Association, Major Indicators of Industrial Technology, 1992; Ministry of Finance, The Status of Foreign Direct Investment, Dec. 1991; The Korean Statistical Association, Major Statistics of Korean Economy, 1992.

within its components results in the following observations:

1. With the exception of heavy industries, large and medium firms import relatively new technologies. This is consistent with Khan's (1997a) finding that the production functions in different firm sizes within the same industry differ.
2. Large size firms also seem to have greater bargaining power. They have shorter waiting periods for adoption of foreign technology.
3. Industries with competitive structures import technology at a slower rate than those which are oligopolistic.

4. In its acquisition, the price of new technology seems less of a determinant than the perceived needs of the firm. In other words, demand for technology imports has been inelastic in many cases.

Given the prevalence of foreign technology in a number of sectors, one should expect more productivity increase in these sectors than in the other sectors with less than state-of-the-art technology. On the whole, this does turn out to be the case. The average for the foreign technology-intensive sectors turns out to be 2.8 per cent TFP growth annually from 1980 to 1994.

If imported technology were the only source of technology for the modern technology system, then the question of whether Korea has a POLIS could be settled immediately. The short answer would be that indeed it has no POLIS. However, the policies of the Korean government and the efforts of large Korean firms to create an innovation system cannot be passed over in silence. In the next section, the Korean innovation system is examined.

*Learning to Innovate: Efforts to Build A Korean POLIS*

Larry Westphal, Howard Pack, Sherman Robinson and Hollis Chenery, among others, have emphasized the role of industrial policy in an export-led economy like South Korea. According to Westphal (1990):

Korea provides an illuminating case of state intervention to promote economic development. Like many other third world governments, Korea's government has selectively intervened to affect the allocation of resources among industrial activities. It has also used similar policies: taxes and subsidies, credit rationing, various kinds of licensing, and the creation of public enterprises...but these policies have been applied in the context of a radically different development strategy, one of export-led industrialization.<sup>6</sup>

If one follows a Schumpeterian approach to technology creation as a cascade of interlinked systemic activities, the possibilities for economies of scale and scope leading to the establishment of a POLIS arise out of the conjunction of a market system open to the world economy and selective interventions. Promotion of targeted infant industries has been part of this strategy of selective interventions in Korea. Examples include cement, fertilizer and petroleum refining in the 1960s. These were followed by steel and petrochemicals. In the late 1970s, shipbuilding,

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<sup>6</sup>. Larry Westphal (1990), 'Industrial Policy in an Export-Propelled Economy: Lessons from South Korea's Experience', *The Journal of Economic Perspectives* (summer), 41. See also, Khan (1985, 1997) and Kim (1989, 1997).

other chemicals, capital goods and durable consumer goods appeared on the list. More recently, electronic and information technologies are being promoted. Do these industries innovate? Even if they individually do innovate, do the industrial, governmental and social institutions connected to the innovation process add up to an innovation system? Furthermore is the innovation system, if it exists, characterized by positive feedbacks?

One quantitative indicator of the possibility of an innovation system would be the trend in R&D. Table 6 shows the major R&D indicators in Korea. Between 1965 and 1990 the expenditures increased more than 500 times. However the major take off has really been since the mid-1980s. Noticeable also is the reversal of the roles of public and private sectors. In 1990 the private sector provided 84 per cent of R&D funds.

*Table 6: Major R&D Indicators in Korea during the key phases of creating the modern and ultimately the high technology system 1965-1990*

	1965	1975	1980	1985	1990
R&D expenditure (\$ Million)	8	88	321	1298	4481
Funds from government (A)	7.2	59	186	247	717
Funds from private sources (B)	0.8	0.8	135	1051	3764
A:B	90:10	67:33	52:48	19:81	16:84
R&D/Manufacturing sales (%)	n.a.	0.35	0.65	1.51	2.07
GNP (\$Million)	2759	20,952	55,345	87,703	234,607
R&D/GNP (%)	0.29	0.42	0.58	1.48	1.91
R&D researchers (persons )	2765	10,275	18,434	41,473	70,503
Research institutes	n.a.	5308	4598	7154	10,434
Universities	n.a.	2312	8695	14,935	21,332
Companies	n.a.	2655	5141	18,996	38,737
R&D researchers per 10,000 pop.	1.0	2.9	4.8	10.1	16.4

Source: Ministry of Science and Technology, Report on the Survey of Research and Development in Science and Technology, various issues;

The number of research personnel is also an important indicator of the possibilities of a POLIS. In the case of Korea, the number of core scientists increased by more than 30 times between 1965 and 1990. Here again, companies and universities are now the first and second largest employers of researchers, respectively.

Another important indicator of an innovation system is the number of patents. In the late 1980s and early 1990s the number of Korean patents grew, on the average, at a rate of 17.1 per cent (see table 7). In absolute terms, however, Korea seems to be still far behind the advanced industrial nations.

*Table 7: Trends of Industrial Property Rights Applied by Korean and Foreign Nationals during the crucial phase of creating a POLIS*

	1986	1989	1990	1991	(Unit: case, %) Average Growth Rate (1986-91)
Patents	12,759	23,315	25,820	28,132	17.1
Utility Models	22,401	21,530	22,654	25,895	2.9
Industrial Designs	18,731	18,196	18,769	20,097	1.4
Trade Marks	28,031	39,832	46,826	46,612	10.7
TOTAL	81,922	102,873	114,069	120,736	8.1
Korean Nat'ls	63,256	68,300	81,713	90,659	7.5
Foreign Nat'ls	18,666	27,271	32,356	30,077	10.0

Source: The Office of Patents Administration, Patents Annals, various issues.

One special feature of the Korean industrial system in general and its innovation system in particular, is the role played by its chaebols, the big business conglomerates in developing and improving industrial technologies. With a large endowment of capital and modern complex organizational structure the chaebol can recruit the best human resources, identify and purchase the best foreign technology and obtain preferential financing. They have also established R&D and technical training facilities recognizing the importance of in-house R&D capability.

The government established the Ministry of Science and Technology (MOST) in the 1960s. It also has initiated a long-term science and technology development plan. Most government ministries and bureaucratic strata have been involved in one way or another in formulating and implementing the science and technology policies. The government has also pursued a scientific and technical human resources management policy.

In the late 1960s, KwahakwhaUndong or the Science Movement was supported by MOST. The creation of a university system has certainly led to an increase in the stock and flow of human capital. However, Korea still has a long way to go before it can claim to have created a world class research university system.

At the microeconomic level R&D capacity building by a firm can be illustrated by discussing the example of Samsung Electronics Company (SEC). SEC is Korea's largest integrated electronics company. Table 8 shows the diverse product lines of SEC.

Table 8: Major Product Line-up of SEC during the creation of the Korean POLIS

Business Sector	Product Line
Audio and Video Business	TV, LCD Projector, VCR, Camcorder, Component Audio, CDP, MD, DCC, LDP, MOD, CD-I, CD-ROM
Consumer Electronics Business	Refrigerator, Microwave Oven, Air Conditioner, Washing Machine, Vacuum Cleaner
Computer System Business	Mini Computer, Micro Computer, Desk-Top PC, Lap-Top/Note PC, Pen Base PC, Palm-Top PC, Network System, Work Station, Optical Filing System, Teleconference System, CTS, BAS
Telecommunication Business	System TDX, Modem, MUX, PAD, Facsimile, Typewriter, Copier, Key Phone, Pager, Car Phone, Hand-held Phone, Optical Communication System, Optical Fiber
Memory Devices Business	DRAM, SRAM, EEPROM, MASK ROM, Specialty Memory, TPH, TFT, LCD, CIS
Micro Devices Business	Discrete, MOSIC, Linear IC, ASIC, Logic IC, Micro Component, DSP

Source: Public Relations Office, Samsung Electronics, Creativity and Innovation (1993), p. 47.

In the semi-conductor field, Samsung developed 64K DRAMs in 1983. In 1990 it shared in the making of 16M DRAM. SEC also exports an electronic switching

Table 9: SEC's Three-tiered R&amp;D System

	Samsung Electronic Company	Samsung Advanced Institute of technology
	Integrated Research Centers	Research Team and Design Office attached to Business Sector
ROLE	Establishment of technological foundation for growth of company Strengthening of Cooperation with SAIT	Maximization of company's profit
RESEARCH AREA	New products development and commercialization on a short- and mid-term basis	Establishment of technological foundation for the growth of the Group Technical supports to affiliate companies Development of new products on a mid- and long-term basis Development of core technologies, bottle-neck technologies, and new materials and parts

Source: Twenty Years History of SEC, 837.

system (Time Division Exchange or TDX) to other LDCs. It also manufactures digital, cellular and satellite transmission systems. It is also active in fiber-optic communication systems. SEC offers a full line of products in the micro-computer field. Perhaps better known among consumers is the line of consumer electronics products of SEC ranging from TV to microwave ovens.

SEC has a three tiered R&D system shown in table 9. Samsung Advanced Institute of Technology (SAIT) carries out research into basic or core technologies. Application technology and mid-term projects are the responsibility of the research centers associated with SEC's four business sectors. Finally, on the production technology side research teams attached to each division unit work closely with production and marketing people to make new or improved products.

The discussion so far shows the strengths and limitations of both the standard macro and micro approaches in addressing the question posed at the beginning of this paper. At the macro level, statistical results may overstate or understate the overall innovative capability. At the same time the results on the whole warn against a casual optimism regarding East Asian growth in general and Korea in particular. The micro considerations show that in contrast to macro-pessimism some companies such as SEC do have considerable innovative capabilities.<sup>7</sup> However, it is not obvious if the SEC experience is generalizable for Korea as a whole or even a few sectors. Thus, there is a great gap at the current stage of research on ICT. Many more sectoral and firm level studies are necessary before firm conclusions could be drawn.

In terms of ICT development, ownership of personal computers and the number of internet hosts as well as telecommunications facilities increased several folds between 1993 and 1998 (Tschang 2000). For example, in 1998, Korea had a total of 7,252,000 personal computers, or on the average 157 PCs per thousand people. This put S. Korea ahead of most Asian economies except for Japan and Singapore. Korea also had 4,015 internet hosts per million people, much further along the way of building a digital economy than the rest of developing Asia.

At the microeconomic, firm level the emergence of the so-called "venture companies" in the ICT sectors could challenge the hegemony of the chaebols. According to the Korea Venture Business Association, there will be about 40,000 such companies by 2005. The Ministry of Information and Communications reported 252 info-tech startup firms for 1999 with a total revenue of 4.9 trillion won. The overall size of the internet economy is estimated as 8 trillion won or two per cent of GDP.

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<sup>7</sup>. In this connection Kim (1997) documents for several industries as well as for the economy as a whole, the growth in technological capabilities of Korea.



The chaebols are experiencing some migration of human resource to some of these startup companies. In response, leading chaebols such as the Lucky Goldstar (LG) and Samsung have initiated strategic moves. These range from incentive pay via stock options etc. to acquiring stakes in ICT companies. In 1999, LG acquired a majority stake in Dacom, a leading ISP and the second largest telecommunications company. SEC has established a strategic alliance with Yahoo! Inc. It has also created a special team in order to identify promising entrepreneurs and to assist them in bringing their products to the market. Samsung now has an Internet Shopping Division. More generally, as a business strategy, the chaebols are establishing incubators to compete with the upstart newcomers. In the year 2000, Samsung had 9 incubators with US\$ 17.6 million in start up funds.

However, graduating out of the ranks of developing countries and joining the OECD involved rapid liberalization of the Korean economy. According to some observers (e.g., Chang 1998). This was directly responsible for Korea's being caught in the Asian financial crisis. Even if one disagrees with the exact causes, there is no doubt that the massive deflation and corporate bankruptcies put Korea's ability to transform itself into a digital knowledge-based economy into question.<sup>8</sup>

Another relevant development for Korea in the international dimension was its signing the WTO agreements. This led to trade liberalization that made technological imports and exports more free and therefore, theoretically, would have resulted in net welfare gain. However, the cases brought against Korea through the dispute settlement mechanism and other bilateral actions, combined with the impacts of the financial crisis, seem to have diminished that hope in the short run.

In the long run, the provisions of TRIPs are the most important for the ICT sectors.<sup>9</sup> The TRIPs agreement with its seven parts and seventy three articles is the most important international attempt to harmonize intellectual property rights (IPRs) globally. The coverage is intended to be comprehensive and contains, for example, integrated circuits designs, biotechnology and software protection in addition to the standard copyright, trademarks, patents and other related areas. There are enforcement provisions requiring civil and criminal measures and border enforcements that are likely to be costly for countries like Korea with ambition to build a POLIS through ICT sectors innovations.

Institutionally, Korea's entry into the WTO in 1994 also meant agreeing to be monitored and reviewed by the TRIPs council and accepting the TRIPs dispute

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8. Consideration of such issues highlights the strengths and limits of the official international views of Korea's transition to knowledge-based economy. See for example Dahlman and Andersson (2000) study for OECD/ World Bank.

9. See Maskus (2000), Lai (1997) and Khan (2001c, 2004, 2012, 2015)

settlement mechanisms. The long run impacts of adhering to all these provisions on Korean digital economy are not clear. In the short run, importing technology would have been easier; but since the Asian crisis many firms have suffered from foreign exchange shortage. At the same time, the foreign currency payments of licensing fee and other IPRs-related expenses have posed additional foreign exchange burdens on the innovating firms.

Space limitations do not allow me to discuss in detail the equally instructive case of Taiwan for Bangladesh. The interested reader is referred to the Taiwan chapter in Kahn (2004). The important point in both the South Korean and Taiwanese development of NIS-ICT through positive feedback loop structures is the synergy of state and private sector—in other words, a genuine institutional complex of PPP. Bangladesh must do the same.

### **Conclusions**

The digital age has brought new opportunities for the developing economies like Bangladesh by presenting some of them with the prospects for leapfrogging. By investing strategically in physical, intellectual and other forms of human capital these economies may be able to forge a path not only in the ICT sectors, but also create innovation systems of their own. Under the emerging globally competitive market environment this will be the best way to compete dynamically. However, creating comparative advantage in this way requires capabilities that many developing countries lack at the moment. Without a mix of openness and strong governance, it is unlikely that even a start can be made.

The case study of Korea presented in this paper is instructive in several ways from this perspective. A strong state under Park Chung-hee, Korea was able to go through several stages of modernization during the 70s and 80s. It created a solid infrastructure and started to generate knowledge-based production and services in the 90s. However, the mix of domestic policy mistakes and exogenous developments in the second half of the decade resulted in the most serious crisis in the Korean economy since the Second World War. The economy is yet to recover from the damage done to its capacity to develop dynamic innovative capability.<sup>10</sup>

Many developing countries seem committed to the path of ICT development.

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<sup>10</sup>. In this connection, the observations made by Chang (2001) in *Pulling Up the Ladder* are particularly germane. The current neoliberal international environment may make such 'technological recovery' and restart most difficult, if not impossible. This is another reason for considering regional cooperation and institution building seriously. See also Khan (1997a, b,c; 2008, 2010, 2015, 2016).

What seem to be lacking are the awareness of some of the pitfalls and the need for both economic resources and institution building. Strategically, developing world class education and training facilities on a regional basis and sharing the burden of ICT sectors development through various regional cooperation schemes may be the best alternative. Therefore, the time may have come to discuss seriously and practically how to develop POLIS and ICT, not for individual national economies, but for entire developing regions in a supranational manner.

Indeed, the creation of a Bangladesh National Innovation System with ICT (BNIS-ICT) as an important component can be hastened through appropriate policies. Under the emerging globally competitive market environment this will be the best way to compete dynamically. However, creating comparative advantage in this way requires capabilities that many developing countries including Bangladesh lack at the moment. Creative policy interventions with a mix of market promotion, good governance, relative openness, and promotion of sustainable development in an equitable manner are necessary if the developing economies are not to be left far behind.

The technical tools I propose in the appendix if implemented with a detailed scientific model and dataset will be ways of enhancing scientific evidence-based policy making for Bangladesh. Ultimately, Bangladesh can play an even more important role through its participation in various Augmented Regional Innovation Systems with ICT (ARIS-ICT). The development of BNIS-ICT and appropriate ARIS-ICT are goals that the Bangladesh government can and should pursue at the highest level by recruiting talent from all over the world, particularly competent Bangladeshi expatriates, and building productive and cost-effective institutions of Public Private Partnership (PPP).

Towards this end, the largely successful examples of South Korea and Taiwan can be studied in greater detail than presented here and many applicable lessons learned. Furthermore, by ensuring that the rural population—particularly small farmers, businesses, rural health care delivery systems etc. — as well as urban small businesses and ordinary citizens are well-served along with strategic sectors, Bangladesh can have both an efficient and equitable innovation system with ICT as an integral part.

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### **Appendix: formal models of POLIS—existence proofs**

In order to give the reader some idea of the problem of formalizing complex technological systems, in this section, I present a ‘simple’ non-linear model embodying distinct technological systems. The model is presented as a Social Accounting Matrix representation of the socio-economic system that was first mentioned in an abstract form earlier. The key distinction here is the explicitly non-linear nature of the functional relationships. The key theorem shows the existence of equilibrium. It is important to underline that the equilibrium is not necessarily unique. Some further considerations (using Herbert Amann’s theorems on fixed points of increasing maps) show that multiple equilibria are the natural outcomes in such models. There would seem to be some role for domestic policy in guiding the economy to a particular equilibrium among many.

As mentioned before, the virtue of an economy-wide approach to technology systems is the embodiment of various inter-sectoral linkages. In a SAM, such linkages are mappings from one set of accounts to another. If there are “n” production activities then there are mappings connecting each activity with as many relevant other accounts (including other production activities) as possible. In terms of technology systems, the production activities can be broken down into a production (sub-) system and a set of innovative activities. In practice, this presents considerable difficulties of classification and empirical estimation. But conceptually the distinction has been made clear.

One major component of the entire innovation system is, of course, the expenditures on R&D. In the SAM presented later, this can appear either as an aggregate expenditure along the column labeled R&D, or as a set of disaggregated expenditures. In the latter case these may be specified according to productive activities (e.g., construction, electrical equipment, the “digital sectors” etc.) or by institutions (e.g., private R&D expenditures, government R&D expenditures, etc.).

It should be emphasized that the dynamic effects of R&D on the economy can be captured only in a series of such SAMs over time. This approach is still at the conceptual stage, but appears to be quite appealing. One can contrast the possible policy experiments that can be undertaken within such a framework with the apparently ad hoc science and technology policies in many developing countries. In particular, the impact over time of a POLIS can be traced by building and maintaining such SAMs. Even without a complete SAM, partial (equilibrium or disequilibrium) analysis can be carried out that can approximate the system-wide results.

In the following model, the main purpose is to establish a multiplicity of equilibria when the innovation system exhibits a non-linear relationship between parts of the socio-economic system. Such a relationship may obtain simply because of the existence of increasing returns to scale in production. Other types of non-linearities may also be present. However, the non-linearities in the production relations are the most relevant ones from the perspective of POLIS. Among other things this creates the possibility of moving from a technologically stagnant equilibrium to equilibrium that makes a POLIS possible.

Choice of new technology in a developing country is affected by research and development in at least three different ways. Such a country can attempt to develop new technology through R&D, as mentioned previously. This ultimately requires a positive feedback loop innovation system in order to be self-sustaining. Another alternative is to adapt existing technology. This too requires a production system geared towards innovation in a limited way. A third alternative is to import technology or to acquire it through attracting foreign direct investment. In practice, all these different forms may be combined.

The abstract model below may be thought of embodying all these different possibilities. However, the first option requires, among other things, a presence of multiple equilibria. In a unique equilibrium world the competitive equilibrium (under the assumption of complete markets) will always be the most efficient one. The presence of increasing returns usually destroys such competitive conditions.

We begin with a number of productive activities reflecting the existing technological structure. We also incorporate the possibility of R&D as a separate productive activity. At the level of abstraction we are working, it is always possible to break R&D down into as many finite components as we want. The key relationship in this context is that between the endogenous accounts (usually, production activities, factors and households) and the exogenous ones. It is this relationship that is posited to be non-linear and this together with some assumptions on the mathematical space can lead to the existence of multiple equilibria, as shown below. We now turn to the formal part of the analysis. The analysis is carried out in abstract function spaces. In the first part the relevant space is a vector lattice over a real field  $R$ . In the second part some results on ordered Banach space are discussed.

### I. The Model on a Lattice

Define  $X$  as a vector lattice over a subring  $M$  of the real field  $R$ .

Let  $X_+ = \{x \mid x \in X, x \geq 0\}$

A non-linear mapping  $N$  is defined such that  $N : X_+ \rightarrow X_+, N_0 = 0$ . Given a vector of exogenous variables  $d$ , the following non-linear mapping describes a simultaneous non-linear equations model of an economy,  $E$  :

$$x = Nx + d \quad (1)$$

for a given  $d \in X_+$ .

This non-linear system represents a socio-economic system of the type described previously. In order to specify the model further, the following assumptions are necessary.

1.  $X$  is order complete
2.  $N$  is an isotone mapping
3.  $\exists \hat{x} \in X_+$  such that  $\hat{x} \geq N\hat{x} + d$

In terms of the economics of the model, the non-linear mapping from the space of inputs to the space of the outputs allows for non-constant returns to scale and technical progress over time. The 3 assumptions are minimally necessary for the existence of an equilibrium. Assumption 3, in particular ensures that there is some level of output vector which can be produced given the technical production conditions and demand structure.

Existence of Multiple Equilibria:

Theorem: Under the assumptions 1 - 3, there exists  $x^* \in X_+$  so that  $x^*$  is a solution of  $x = Nx + d$

Proof: Consider the interval  $[0, x] = \{\hat{x} \mid \hat{x} \in X_+, 0 \leq \hat{x} \leq x\}$  where  $\hat{x}$  is defined as in assumption 3. Take a mapping  $F$ .

$$F : x \in X_+ \rightarrow Nx + d$$

$F$  is isotone and maps  $[0, x]$  into itself.

Define a set  $D \equiv \{x \mid x \in [0, x], x \geq Fx\}$ .

By assumption 3,  $D$  is non-empty.

We now show  $x^* \equiv \inf D$  is a solution to  $x = Nx + d$ .  $x^* \equiv \inf D$ ; Therefore  $x^* \leq x, \forall x \in D$ .  $F$  is isotone; therefore  $Fx^* \leq Fx \leq x$  for each  $x \in D$  implying.

$$Fx^* \leq x^*$$

From (2) we have  $F(Fx^*) \leq Fx^*$ . Thus  $Fx^* \in D$ ; hence  $x^* \equiv \inf D \leq Fx^*$  so,  $Fx^* \leq x^* \leq Fx^*$ . Therefore  $x^* = Fx^*$ .

This is an application of Tarski's and Birkhoff's theorem. The key feature to note here is that the equilibrium is not necessarily unique. It should also be noted that under additional assumptions on space  $X$  and the mapping  $N$  the computation of a fixed point can be done by standard methods (e.g. Ortega and Rheinboldt).

## II. Multiple Equilibria on Banach Space

In this section the results for multiple equilibria are extended to functionals on Banach Space. We can define the model again for monotone iterations, this time on a non-empty subset of an ordered Banachspace  $X$ . The mapping  $f : X \rightarrow X$  is called compact if it is continuous and if  $f(x)$  is relatively compact. The map  $f$  is called completely continuous if  $f$  is continuous and maps bounded subsets of  $X$  into compact sets. Let  $X$  be a non-empty subset of some ordered set  $Y$ . A fixed point  $x$  of a map  $N : X \rightarrow X$  is called minimal (maximal) if every fixed point  $y$  of  $N$  in  $X$  satisfies

$$x \leq y (y \leq x)$$

Theorem: Let  $(E, P)$  be an ordered Banach space and let  $D$  be a subset of  $E$ .

Suppose that  $f : D \rightarrow E$  is an increasing map which is compact on every order interval in  $D$ . If there exist  $y, \hat{y} \in D$  with  $y \leq \hat{y}$  such that  $y \leq f(y)$  and  $f(\hat{y}) \leq \hat{y}$ , then  $f$  has a minimal fixed point  $x$ . Moreover,  $x \leq y$  and  $x = \lim F^k(y)$ . That is, the minimal fixed point can be computed iteratively by means of the iteration scheme

$$\begin{aligned} x_0 &= y \\ x_{k+1} &= f(x_k) \quad k = 0, 1, 2, \dots \end{aligned}$$

Moreover, the sequence  $(x_k)$  is increasing.

*Proof:* Since  $f$  is increasing, the hypotheses imply that  $f$  maps the order interval  $[\bar{y}, y]$  into itself. Consequently, the sequence  $(x_k)$  is well-defined and, since it is contained in  $f[\bar{y}, y]$ , it is relatively compact. Hence it has at least one limit point. By induction, it is easily seen that the sequence  $(x_k)$  is increasing. This implies that it has exactly one limit point  $\bar{x}$  and that the whole sequence converges to  $\bar{x}$ . Since  $f$  is continuous,  $\bar{x}$  is a fixed point of  $f$ . If  $x$  is an arbitrary fixed point in  $D$  such that  $x \geq \bar{y}$ , then, by replacing  $y$  by  $x$  in the above argument, it follows that  $\bar{x} \leq x$ . Hence  $\bar{x}$  is the minimal fixed point of  $f$  in  $(\bar{y} + P) \cap D$ . It should be observed that we do not claim that there exists a minimal fixed point of  $f$  in  $D$ .

We can also show that if  $F : x \in X_+ \rightarrow Nx + d$  is an intersecting compact map in a non-empty order interval  $[x, \hat{x}]$  and  $x \leq Fx$  and  $F\hat{x} \leq \hat{x}$  then  $F$  has a minimal fixed point  $x^*$  and a maximal fixed point  $x^{**}$ . Moreover,  $x^* = \lim F^k(x)$  and  $x^{**} = \lim F^k(\hat{x})$ . The first of the above sequences is increasing and the second is decreasing.

The above results are applications and extensions of fixed point theorems for increasing maps on abstract spaces due to Herbert Amann (1976). It is intriguing that they find such natural applications in economics with evolving technology systems and non-constant returns to scale. Although those theorems provide some structure for the equilibria in the socio-economic structure with evolving technology systems, it is not specified a priori which equilibrium will be reached. The problem of equilibrium selection thus remains open.

The idea behind POLIS can now be stated more formally. It is to reach a sequence of equilibria so that the maximal fixed points that are attainable are in fact reached through a combination of market forces and policy maneuvers over time. It is also to be understood that path-dependence of technology would rule out certain equilibria in the future. Thus initial choices of technologies can matter crucially at times. This highlights the need for choosing the appropriate types of ICTs and creating complementary human and knowledge capital right from the beginning.

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- i. Both types of specifications are possible in principle. In practice, as in the case of South Korea, the availability of data will often determine what type of specification will be used.
  - ii. If SAMs are available at regular intervals (Indonesia is one such country), then models with flexible prices, different closure rules, etc., can be constructed over time.





## An Ethical Analysis of Quick Rental Power Plants in Bangladesh

SAKIB B. AMIN\*  
M. ASHIQUR RAHMAN KHAN\*\*  
ANIKA TASNIM\*\*\*

**Abstract.** *Energy is a strategic determinant of economic growth. Therefore, energy crisis can negatively affect the development process of any small economy like Bangladesh. Hundred percent excess to electricity to all the citizens is one of the main agendas of Bangladesh government. Therefore, to reduce the energy crisis and provide the electricity to all, Bangladesh government invited Quick Rental companies in 2010 as a short-term solution. The duration of these Quick Rental companies were 3-5 years but their activities are still going on. Since these companies burn imported oil to generate electricity, there is a growing ethical consensus about the impact of these Quick Rental companies in the energy sector of Bangladesh. To the best of our knowledge, there is no paper so far assessing the impact of Quick Rental companies considering ethical aspects. Therefore, the main objective of this paper is to discuss the role of Quick Rental companies in Bangladesh economy through an analytical and ethical discussion.*

### 1. Introduction

Bangladesh has been maintaining a very significant GDP growth rate over the past few years which cause high electricity demand among the consumers. In 2009, when the current government came into power there were high pressure on them

\* Assistant Professor, School of Business and Economics, North South University, Dhaka, Bangladesh, E-mail: sakib.amin@northsouth.edu

\*\* Department of Economics, University of Dhaka, Dhaka, Bangladesh  
E-mail: ashiquurkhan69@gmail.com

\*\*\* School of Business and Economics, North South University, Dhaka, Bangladesh  
E-mail: anika.tsn28@gmail.com

to provide adequate amount of electricity to the different sectors. Especially the manufacturing sector which is considered as the “Thrust Sector” of our economy was hampered due to inadequate supply of electricity causing disruption in their production process. So, there was a clear problem for the government as the demand exceeded the generation by 2000MW. The problem was not very easy to mitigate given the state of the plants producing electricity during that time. Also, to add to this problem were no proper planning on how to improve this sector causing very little improvement in this sector. As a result of this problem the government had to take some emergency initiatives to mitigate the problem. So, the government planned to produce 5000MW by 2011 and 7000MW by 2013. But the problems of lack of financial resources and primary energy source, the plan became very difficult and challenging to achieve.

The primary source of producing electricity in Bangladesh has been natural gas as more than 80% were generated using gas fired power plants. But in 2008-09 there were shortages in gas supply and predictions by Government agencies showed that supply of natural gas would run out by 2031 at current extraction rate. So, there was pressure to switch to different sources. There was abundance of coal but lack of extraction and pressures from the environmental groups made it less convenient for the government to start extensive use of coal for generation of electricity. As a result, the government went for “Quick Rental Power Plants” (QRPP) and encouraged private firms to participate through tendering. Some 33 power plants were given permission to produce electricity using furnace oil and diesel. Agreements were signed with the private sector electricity generating companies to purchase electricity from the rental power plants which would be then added to the National Grid for transmission and distribution.

This sums up why and how quick rental power plants were initiated in Bangladesh during 2009. At present, there are around 34 oil-fired power plants and the numbers may increase this year as there have been recommendations to increase the generation capacity using the private plants. According to the Bangladesh Power Development Board, “If we rely on the existing power plants there will be chaos in the hot season. We have no alternative but to allow more rental power plants as mega and medium capacity power plants will come into operation after 2019.” So, this idea of quick rental power plant is actually helping Bangladesh throughout this process and has reduced the number of blackouts/ load shading compared to the earlier times.

As the government will have to wait until 2018 to implement any coal-based power plant, the government has decided to extend the tenures of the quick rental

power plants. So the QR power plants has given the government sufficient time to plan for the future ahead and fix the energy problem (electricity) crisis with ease. But the continuation of these policies will affect the long-run sustainable electricity generation capacity of Bangladesh. Moreover, seven of these QRPP companies in on the verge of receiving extension in their contract ranging from 5-15 years. This can prove to be dangerous for the economy and the long-term energy security of our country as short-term fixes have a lot of opportunity cost. The government is selling the electricity at a subsidized price due to the high cost production of the rental power plant electricity. This is putting a lot of pressure on the budget as the deficit is increasing. The other sectors such as education, health care and infrastructure are losing out because of the wastage of funds in filling out the deficit.

Despite fulfilling the energy demand, Quick rental companies are liquid fuel based which causes environmental degradation. We know that these oil production industries contain significant risks like toxic chemicals, water contamination, irreversible environmental degradation and destruction of ecosystems. There are many advantages to using renewable energy sources instead of non-renewable energy sources. Unlike coal, oil, or gas, the renewable energies of the sun, wind, water, and geothermal are clean, accessible, abundant and sustainable. Using renewable energies lowers carbon (CO<sub>2</sub>) emissions. Most are available everywhere in the world. Together, the supply is everlasting. They can support ecosystems and ensure future availability. The benefits of renewable energy are clear.

Yet, approximately 80% of the energy human beings use around the world still comes from non-renewable sources that are environmentally destructive. There are many reasons why this is the case, including: Economic and political systems of the developed world which are deeply rooted in fossil fuel use Lifestyle habits of people in the developed world that are shaped by these economic and political systems and expend large amounts of non-renewable energy Although the government has decided to extend the contract of QR companies to generate electricity, still there is a question regarding the fact that whether the QR companies affects negative impacts in the long run. It should be ensured the benefits of QR companies will outweigh the negative consequences cost by fiscal burdens. So, decisions should be taken from ethical considerations.

To the best of our knowledge, there is no paper so far assessing the impact of Quick Rental companies considering ethical aspects. Therefore, the main objective of this paper is to discuss the roll of Quick Rental companies towards Bangladesh economy through an analytical and ethical discussion.

The rest of the paper is organized as follows. Chapter 2 focuses on Importance of Energy Sector towards Economy. Chapter 3 gives a brief Overview. Chapter 4 critically describes the linkage of Ethics and Energy Economics. Chapter 5 highlights The Benefit of Quick Rental Companies in the energy sector of Bangladesh. Chapter 6 ethically examines the effectiveness of Quick Rental companies as a solution to mitigate energy sector. Finally, the Conclusion is at Chapter 7.

## **2. Importance of Energy Sector towards Economy**

Energy is considered as the lifeblood of the economy. It is an essential input for almost every good and service. Energy plays a important role in the development process of a country. It not only enhances the productivity of factors of production, but also promotes higher living standards. The term “energy” mainly covers a wide range of products such as electricity, oil, natural gas, coal, biomass and other renewable sources. According to World Bank (2000) no country has managed to develop beyond a subsistence economy without ensuring at least minimum access to electricity services for a broad selection of its population. Moreover, in a study of over 100 countries, Ferguson et al. (2000) find a strong correlation between electricity usage and the level of economic development and growth.

The general conclusions of this research are that wealthy countries have a stronger correlation between electricity use and wealth creation than do poor countries and that, for the global economy as a whole, there is a stronger correlation between electricity use and wealth creation than there is between total energy use and wealth. The study also shows that, in wealthy countries, the increase in wealth over time correlates with an increase in the electricity ratio.

Electricity is known as one of the most widely used forms of energy and therefore the electricity industry is an important sector for any economy. Electricity, being an energy carrier, provides energy input to different development processes that vary depending on consumer group such as industrial, service, residential and government. Oil is another vital source of energy in the economy and always been considered as an indicator of economic stability due to the world’s high dependence on oil products.

Energy price is a crucial driver of the world economy and changes in the price of energy can have significant effect on macroeconomic condition and welfare in both developed and developing countries around the world. The transmission mechanisms through which energy prices have an impact on real economic

activity include both supply and demand channels. There is the classic supply side effect according to which rising energy prices are indicative of the reduced availability of a basic input to production; leading to a reduction of potential output (Brown and Yücel, 1999). An energy price increase may also have a negative effect on consumption through its positive relation with disposable income.

From demand side perspective, when energy prices rise, consumers are unable or unwilling to reduce energy consumption and may reduce expenditures on other goods and services, potentially upsetting the macroeconomic condition (Lescaroux et al., 2008). Naturally, the bigger the energy price increase and the longer higher prices are sustained, the bigger the macroeconomic impact. The strength of the link between energy and macro economy is affected by different factors. The long run level of economic activity is determined principally by labor productivity, which is determined part by the net supply of energy. In the short run, economic theory argues that an increase in energy prices leads to an increase in the domestic price level and a decrease in output due to higher cost. There is growing recognition that energy supply can transform people's lives and does serve as an engine for economic and social opportunity (World Bank, 2013).

Recent empirical literature till to date observes over a hundred studies on causality between GDP and energy (both at aggregate and disaggregate level) consumption using various methodologies across the countries. The existing empirical literature finds support for four possible hypotheses between energy consumption and economic growth; they are growth, conservation, neutrality and feedback hypotheses. The growth hypothesis suggests that an economy is energy dependent where energy consumption leads to economic growth and a shortage of energy may negatively affect economic performance, leading to a fall in income and employment. The hypothesis suggests that energy is a vital and necessary input along with other factors of production such as labor and capital.

On the other hand, the conservation hypothesis suggests that an economy is not energy dependent where energy conservation policies may be implemented with no adverse effect on growth and employment. The feedback hypothesis suggests that energy consumption and real GDP are interrelated and complementing each other. Finally, the neutrality hypothesis suggests that there is no causality in either direction and changes in energy consumption are not associated with changes in GDP, so that energy conservation policies may be pursued without adversely affecting the economy. They have argued that since the cost of energy is a very small proportion of GDP, it is unlikely to have a significant impact; hence there is a "neutral impact of energy on growth."

### **3. Overview of Electricity Sector in Bangladesh**

Energy plays a vital role in the socioeconomic development of a country. Thus, the government of Bangladesh has been putting its best efforts to develop the indigenous energy resources. In fact, to upgrade the socio-economic condition and to alleviate poverty, electricity sector has been prioritized by the government. Bangladesh has one National Grid with an installed capacity of 15,379 MW as on February 2017. Electricity is one of the major reasons of slow GDP growth so government has decided to build more power projects through private sector and public private partnership.

As 2015, 92% urban population and 67% rural population have the access to the electricity for their source of light. Average 77.9% population have the access to the electricity in Bangladesh. Bangladesh's total installed electricity generation capacity (including captive power) was 15,761 MW as of 30 August 2017. Energy use in Bangladesh is quite low when compared to other developing countries in South Asia. According to US Energy Information Administration, USEIA, 2015, total energy use in Bangladesh in 2012 is only 0.20% of world consumption. Per capita consumption of electricity is still low in Bangladesh.

However, the annual growth rate of energy use was about 5% during 2000-2010, which is a lot faster than the other neighboring countries in South Asia.

Problems in the Bangladesh's electric power sector include, high system losses, delays in completion of new plants, low plant efficiency, erratic power supply, electricity theft, blackouts, and shortages of funds for power plant maintenance. Overall, the country's generation plants have been unable to meet system demand over the past decade. Bangladesh has small reserves of oil and coal, but very large natural gas resources. Commercial energy consumption is mostly natural gas (around 66%), followed by oil, hydropower and coal.

Electricity generation in Bangladesh was almost entirely dependent on natural gas because of its local availability and there was a sharp increase in oil prices in the early 1970's and Bangladesh switched fuel sector from oil to natural gas. But. Bangladesh's natural gas reserves are expected to last till 2031 at current extraction rate which would endanger the energy security of Bangladesh (Ministry of Power, Energy and Mineral Resources, 2015). The growth in gas demand will exceed supply in future. According to PETROBANGLA (2015), recent reserve estimation, current gas production and consumption rates and future demand projections suggest that known recoverable reserves of gas will not be able to cater the growing energy needs of the country and Bangladesh is now on the threshold of a critical stage.

During 1992, the country's total installed capacity of electricity generation was 2,350 million watts (MW), while the derated capacity was 1,719 MW. The installed capacity increased to 4,680 MW in 2002 and further to 10416 MW in 2014, with the corresponding derated capacities of 3,428 MW and 9821 MW respectively. That means, the addition in installed capacity is not reflected in terms of proportional increase in electricity generation. There are many factors that contribute to the difference between the installed capacity and the maximum available generation (derated capacity). For example, some plants may remain out of operation for maintenance, rehabilitation and overhauling, and the capacity of some plants may be derated due to aging. However, the shortage of natural gas, which is the major fuel used for electricity generation, is the most important factor for low-capacity utilization in Bangladesh.

To mitigate this supply-demand mismatch, government entered into contractual agreements for high-cost temporary solution, such as quick rental power plants and small independent power producers (IPPs, mostly diesel or liquid-fuel based) on an emergency.

“In 2009-10, the generation was about 3,500 MW while the peak demand was about 5,500 MW indicating a deficit of 2,000 MW. Moreover, the deficit was continuously rising as new demand for electricity was generated in the growing economy.” (Mustafa. K.M, 2013).

The change in the fuel mix of electricity generation has significant implications for the cost structure and total subsidy cost. The use of liquid fuel high speed diesel and furnace oil has increased significantly in the last few years, which has, in turn, increased the per-unit generation cost of electricity at present.

With furnace oil and diesel now accounting for around 21% of fuel mix for electricity generation, the average cost for bulk supply stands at BDT 5.88/KWH in 2014. This was BDT 5.36/KWH in 2012. The increase in generation cost is due to the increase in share of liquid fuel based power plants and also the increase in prices of liquid fuel.

Power generation sector is rising but power transmission and distribution are still lacking behind. One of the reasons might be the Single Buyer System prevailing in the power sector. Most of the electricity generated is either produced or purchased by BPDB making it the sole customer of power generation companies. To get the complete benefits of the power supply these three sectors (generation, transmission and distribution) should work separately.

#### **4. Ethics and Energy Economics**

Energy is not an ethical issue. Indeed, it is a very young subfield of applied ethics. Energy is part of our everyday lives and is often taken for granted. This is not surprising, as energy appears to be artificially cheap and seemingly plentiful. This “illusion of plenty” has likely contributed to the problem by diluting ethical issues related to our energy systems. Greenhouse gas emission and climate change have also put attention to several ethical issues with our energy systems.

Fereidoon P. Sioshansi, President of Menlo Energy Economics, emphasizes “The key question is not how are we going to get more energy, but rather why are we using so much of it and what for?”

The ethical issues with energy can be divided into three categories: producers, consumers and policy. Although these categories are not solid and some of the issues will overlap between two or all categories energy producers face ethical issues in the way energy is extracted and produced. All energy sources will involve the transformation of nature. Several energy industries (oil and gas production, mountaintop removal coalmining, uranium mining) contain significant risks such as: toxic chemicals, water contamination, irreversible environmental degradation, destruction of ecosystems, and relocation of communities. These raise important ethical issues that environmental philosophy deals with.

Another major concern is the issue of externalities in energy. The current energy market does not pass on the full cost for the energy that is produced, but some of the major costs of energy production have been externalized. This cost is never actually ‘paid’ by consumers or producers, the cost becomes externalized as a social cost. In addition, the “illusion of plenty” which is created by the “extensive supply and distribution network that connects consumers to virtually endless supplies of energy” followed by the lack of price signals at the point of consumption, disconnects consumers from the costs and the environmental impacts of energy production.

The ethical issues that face energy consumers are questions about responsibility and complicity. Are individuals morally responsible for purchasing energy from energy sources that promote climate change? Are individuals morally required to change their energy-intensive lives? The most important issue related to consumers is linked to lifestyle choices, the way they use energy. Surprisingly, the way we use energy in our daily lives has not received nearly as much attention as it deserves. It is much easier to make changes on an individual level than governmental (policy) or collective levels (producers).



An important ethical issue facing energy policy is the issue of trade-offs. Every single energy technology has its negative impacts and energy policy must make difficult decisions between the different choices available. Even if the most environmentally friendly technologies are chosen or available, still there will be always technological negative impacts.

So, consideration of energy issues has many implications on human society. The use of fossil fuels has been identified as a major contributor to global climate change, with serious ethical implications. Replacement of fossil fuels by hydroelectricity involves dam construction and flooding, displaces rural populations, destroys forest and wildlife habitats, interferes with fish populations, and changes sediment transport and deposition patterns. The construction of concrete dams releases large amount of greenhouse gases to the atmosphere, and in many areas dams have a limited life span. Decommissioning dams raises significant environmental questions, is very costly, and will require further substantial releases of greenhouse gases. Development of nuclear power, once seen as the answer to the energy dilemma, has proven to be difficult, a possible health risk, and less reliable and more expensive than initially predicted. Solar energy, geothermal energy and wind have significant potential for generating electricity in some areas, but may involve aesthetic alterations to human environments that are deemed unacceptable. Tidal and wave action as a source of energy have been little developed, and while they could have local significance, energy storage and distribution issues remain to be solved, and there may be environmental and aesthetic constraints.

Energy is not just a technological issue but involves difficult ethical choices. Science and engineering are crucial in finding more ethical and environmentally friendly technologies for our energy systems, but technology can never estimate our choices. We are faced with serious ethical decisions and choices, and ethics must be involved to ensure that important aspects of our energy systems are not overlooked. Ethics play an important role in issues of development for the future by clarifying values at stake in policy decisions and giving moral reasons for alternative courses of action. Environmental and development questions are loaded with moral implications that need to be understood and carefully weighed before intelligent choices are made. With the help of ethics, a new social paradigm should evolve that would promote sustainable development with the maintenance of cultural diversity, social justice and equity.

### **5. Benefits of quick rental companies in Bangladesh Energy sector**

The name quick rental power plants itself suggests that the rental power plants are easy to set up and therefore, can supply electricity to the national grid within a very short period of time. In times of crisis this is very helpful for quick generation of electricity. These power plants are typically installed within 4-6 months and hence are ideal for meeting short-term electricity needs; they utilize scarce resources efficiently and create local employment. The quick rental power plants provide an easy and short-term solution. It needs to be remembered that the fast-track development of the rental plants is a widely used option across the world to resolve the power crisis on an urgent basis, and there does not seem to exist any better solutions to the crisis at present.

Most of the rental power plants are private and therefore it means government does not have to invest on building the plants. Since quick rental plants do not involve capital investment on the part of the government in these power projects This saves a lot of funds for the government which can be used for the long-term electricity generation projects. The cost of purchase and setting up of power plants are borne by the sponsors and the government in no way guarantees any repayments to the lenders of the rental plants. The quick rental plants can create efficiency and competence to the country's other power plants particularly of the public sector.

One additional benefit of these rental projects is that technically only the amount of electricity supplied would be liable for payment. Quick rental plants in Bangladesh have the same configuration of 15-20 years IPPs and hence these can be used, if necessary, as IPPs with a lower, structured payment.

In 2011-12 year, the contribution to the GDP of additional electricity generated by the QRPPs (5,067.8 M kWh) has been between Tk. 23,312 crore and Tk. 54,226 crore at constant 1995/96 prices. Obviously, if electricity from the QRPPs was not produced, along with lower GDP growth and reduced sectoral output, would have reduced the export growth rate and created adverse impact on other macroeconomic and sectoral indicators including employment generation and poverty reduction.

The additional power supplied to the national grid through the QRPPs has made significant positive impact in many areas of the economy. The supply of additional power has no doubt contributed to the expansion of economic activities in various sectors including manufacturing industries, RMGs, commercial and business activities, agriculture through providing irrigation and better marketing and processing services, and in trade, communication, and other services. This has

significantly helped to keep the GDP growth rate over 6 percent along with a healthy export growth despite global recession and other constraints.

Quick rental power plants provide electricity in the short-run while the policy makers can develop and implement strategies for the long-run. So, the government is buying itself some precious time while the quick rental power plants are working it can solve the energy crisis issue and ensure sustainable long-term growth of the country.

Moreover, if government did not go for the quick rental option during the power crisis time, the power situation could have been much worse. For a country like Bangladesh, increasing the gross generation capacity by 3,100 MW within a period of around three years is no doubt a big achievement even though the demand over the period also shot up by 7,500 MW which did not have much impact on the consequent load shedding.

## **6. Can Quick Rental Companies be considered as a solution to mitigate energy crisis: An ethical discussion**

Over the last few years, severe power crisis compelled the government to enter into contractual agreements for high-cost temporary solution, such as rental power and small independent power producers (IPPs, mostly diesel or liquid-fuel based) on an emergency basis. A significant portion of the additional electricity generation has come from liquid fuel based power plants which has raised the total contribution of liquid fuels in power generation to 17 percent in 2012 from 13 percent in 2011 and 5 percent in 2010. Even though quick rental power plants have increased electricity generation, the use of liquid-fuel or diesel in energy sector raises many ethical dilemma in our energy system.

Petroleum is extracted beneath the Earth's surface. Then it is refined into various type of fuel. These fuels are then used to produce energy as a form of electricity. As the demand of electricity increases, also the usage of fuel rises in the energy sector. But these fuels cause massive environment degradation across the world because it is toxic to almost all forms of life and it causes climate change. Large amount of petroleum is burnt to produce fuel which creates large amount of CO<sub>2</sub> (carbon dioxide) gas that traps heat in the Earth's atmosphere. This CO<sub>2</sub> is the main greenhouse gas which causes global warming. The other produced compounds are often toxic to life. Examples are carbon monoxide and methanol which pollutes the air severely. High temperatures created by the combustion of petroleum cause acid rain. It causes many problems such as dead trees and acidified lakes with dead fish.

Acid rain leads to increased corrosion of machinery and structures and to the slow destruction of archaeological structures. Petroleum hydrocarbons such as gasoline, diesel, or jet fuel intruding into indoor spaces from underground storage tanks or brown fields threaten safety and causes adverse health effects from inhalation. Also, sea oil spills cause the mammals, reducing its insulating ability, and making them more vulnerable to temperature fluctuations. Lastly, the waste oil is produced due to the combustion of petroleum which has become unsuitable for its original purpose due to the presence of impurities or loss of original properties. This oil contains toxic like Benzenes which poisons both soil and drinking water. Runoff from storms carries waste oil into rivers and oceans, poisoning them as well. Thus, it implies that excessive use of fuel is a threat to the ecosystem and all forms of life around the world.

Every single energy technology has its negative impacts and energy policy must make difficult decisions between the different choices available. So, Government must choose energy policy which is the most environmental friendly and the price of the energy is cheaper with the highest efficiency. Currently the government has taken a lot of plans to increase the electricity generation capacity of our country. This a positive sign as the economy will benefit from it.

However, the amount of policies being undertaken lacks a clear and precise vision. Also, it seems that the policies in the plans are not followed instead they remain in the books only and other policies are being undertaken. According to the “Power System Master Plan 2016” the government would focus more on long term project using coal and other renewable sources. Notwithstanding, this policy is not being maintained as the Government recently granted rental power plants extension ranging five to fifteen years. So, this show there is a clear discrepancy between what the policy and the actions being taken.

Many people suggest that these steps are taken because in the current tenure of the government long-term projects cannot be finished so they are going for short term fixes. Also, some influential people are making money out of these power plants by extending their contracts and getting permission for new ones. Renewable energy is one of the long term options for Bangladesh. For example, renewable energy helps in reducing poverty and environmental degradation. It makes it easier for everyone in the economy to be able to attain electricity and get benefits from it. This energy comes from sunlight, wind, rain. River current, geo-thermal heat, etc. all of these is renewable. This policy will also benefit the excess demand scenario in Bangladesh.

It is true that to mitigate short-term energy crisis, quick rental power plants are very effective, but for the long-term sustainable economic growth and development it is not an ideal solution. It is harmful for the environment as well as expensive compared to its efficiency whereas; successful long-term projects will ensure energy security and reduce the energy cost.

## **7. Fuel Diversification as an alternative Solution**

The use of imported High Speed Diesel (HSD) and Furnace Oil (FO) has risen alarmingly which, although added electricity to the national grid, actually meant that the government's public expenditure budget was inefficiently allocated to pay the corresponding import bills. This had probably crowded out the nation's potential investment in other productive sectors creating adverse economic impacts. The country's growth prospects are being hampered. Moreover, the nation's vast dependence on imported fuel has also attributed to an unnecessary fiscal burden, exerting multidimensional pressures on its economic development drives. Thus, it is crucial for Bangladesh to prepare itself for the near future and plan its fuel diversification strategies keeping in line with the trends in the global energy markets. It is also important to utilize the domestic energy sources other than relying on imported resources.

In the past, there was a global trend of being heavily dependent on the use of fossil fuels and non-renewable energy resources which not only minimized their reserves but also caused environmental degradation. Bangladesh can look forward to replacing fossil fuel and non-renewable energy with renewable energy in order to match its local energy demand.

Biomass is one of the main non-commercial resources of Bangladesh. Biomass as a versatile source of energy is primarily used in rural areas to meet the energy needs for cooking. The traditional biomass sources include agricultural residue (rice husks, rice and jute stalks, sugarcane bagasse, etc.), animal waste (mainly dried form, but some biogas plants, too) and fire wood. These renewable biomass resources are considered to have significant potential to meet the energy demand, especially in the rural areas.

In addition to these, biomass can be extremely helpful for farmers who no longer have to rely on expensive diesel and kerosene to run irrigation pumps and lighten houses, using biogas as a substitute to these fuels. The abundant supply of solid biomass can even be converted into compressed natural gas that can be employed to run vehicles whereby the import bills, arising from petroleum imports, could be

reduced. Furthermore, second generation bio-fuels from *Jatropha*, etc. can also supplement the national energy supply.

Bangladesh can also tap its superior quality coal deposits for clean coal-based electricity generation purposes, provided skills development in the energy sector is ensured. Large scale coal-based power plants can be set up which, although is subject to time, can resolve the nation's electricity deficit to a great extent, provided measures to protect the environment are ensured. Although substantial amounts of coal reserves in seven fields have been discovered in the north-western part of the country, still the coal sector of Bangladesh is quite underdeveloped. The Government was in the process of reviewing the country's coal policy, which would set the regulations for the development of the coal industry and help establish a reliable source of energy for the country through the use of coal as the primary fuel for power generation. The Rampal Power Station is a proposed project which is a coal-based power plant with a 1320 MW production capacity.

Bangladesh is expected to have enormous potentiality in renewable energy development. Renewable energy is energy, which comes from natural resources such as sunlight, wind, rain, tides and geo thermal heat which are renewable. Renewable energy helps in reducing poverty, aid in energy shortage and environmental degradation such as desertification, biodiversity depletion and climate change (Power Division, 2015). Regarding the institutional development, government power utilities like Bangladesh Power Development Board (BPDB), Rural Electrification Board (REB), Local Government Agency like Local Government Engineering Directorate (LGED) and a significant number of private sector agencies including NGOs are already involved in renewable energy development.

A nodal agency, i.e. Sustainable and Renewable Energy Development Authority (SREDA) as envisioned in the Renewable Energy Policy is established and in the process of manning this organization so that it can work according to the desire of the people. This organization will provide policy support to the government as well as work to promote, expand and develop the renewable energy and to enhance energy efficiency both in public and private sector. Moreover, this organization facilitate private sector to get involve in renewable energy and energy efficiency business. Electrification of villages in remote areas generally requires huge investment and leads to power losses associated with transmission and distribution networks.

Additionally, at the current annual rate of growth of consumption of 10% the natural proven reserve of natural gas may not last more than 15-20 years. One of the great promises offered by the renewable energy technologies is their potential to provide electricity in areas not served by national power grids. There is no doubt about the fact that renewable energy will take a crucial role not only for off grid electrification in the country but also for future electricity generation as a whole. Among the renewable energy sources, hydropower currently represents less than 5% of total installed electricity generation capacity. Among the renewable energy sources, hydropower currently represents less than 5% of total installed electricity generation capacity. Since the country is a flat one, opportunities for installing further hydropower plants is negligible, although micro hydro and mini hydro have limited potential in Chittagong Hill Tracts.

However, the country is blessed by considerable solar radiation. Bangladesh receives an average daily solar radiation of 4-6.5 kWh/m<sup>2</sup>. Solar photovoltaic (PV) are gaining acceptance for providing electricity to households and small businesses in rural areas where electricity is not available from national grid. However, potential of other renewable resources is still at the exploration stage. Potential of wind energy is mainly in coastal areas and offshore islands and to determine extent of potential wind resource mapping project is in process. Some of the development partners and companies come forward for wind mapping in different parts of the country.

Finally, Bangladesh is advised to participate in cross-border electricity trading across the South Asian region, importing hydropower, the cheapest form of electricity, from Bhutan since Bangladesh do not have geographical advantages. However, regional trade among South Asian economies is not as much as strong between other countries, especially amongst the developed ones. At present, Bangladesh mainly imports electricity from India. However, it can also look to diversify its import partners and look towards countries like Bhutan and Nepal that have comparative advantages in producing hydropower.

## **8. Conclusion**

The benefits from “Quick rental power plant” policy implemented during 2009 cannot be scrutinized as they came onto the economy’s rescue when we needed energy the most. The excess demand of electricity was around 2000MW during 2009 so QRPP helped a lot in reducing this gap. Different sectors benefited from it as the supply went from erratic to adequate. We can see it that the amount of load-shedding has decreased substantially thus reducing the troubles of the

households. The manufacturing and service sector also benefited from these QRPP as they could maintain steady level of production and service.

However, this cannot be a solution for the long-term energy security. These power plants have duration of 3-5 years. Recently, government has granted rental power plants extension ranging five to fifteen years. The government is selling the electricity at a subsidized price because oil market is very volatile across the world. This has certainly created pressure on the budget as the deficit is increasing. So, long-term energy policy should be taken for the energy sector which is less costly with more efficiency and environment friendly.

More importantly, these power plants generate electricity by burning imported oil which is extracted from petroleum. This raises an ethical consensus about the effects of quick rental companies in Bangladesh. By burning oil, huge amount of Carbon dioxide and harmful greenhouse gas are being released in the environment. Excessive use of oil in the energy sector contributes to the environment degradation by releasing more toxic gases which are mainly responsible for global warming. Therefore, Electricity production is the single biggest contributor to the emissions that cause climate change. To government should grant energy policies and solutions where less fossil fuel are being used and since our rising electricity consumption requires more and more power to be generated, and although peoples' energy efficiency can help reduce this, the real alternative is to source electricity from renewable resources. Switching to a green energy (renewable energy) supplier is a positive step to take – it is a win-win situation both for the environment and the energy consumers. Government can easily make policies that are less costly and more environment friendly, renewable energy as the long-term solution and this will remove the burden of short-term quick rental power plants in the long run.



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## Role of RAKUB for the Empowerment of Women in the North-Western Region of Bangladesh: Some Ethical Issues

SUKHE KHATUN\*

RABEYA BASRI\*\*

M. MOAZZEM HOSSAIN KHAN\*\*\*

**Abstract:** *The objective of the article is to examine the role of RAKUB for the empowerment of women entrepreneurship in Rajshahi, Bangladesh. It serves to empower its women participants. This study is defining empowerment in terms of control over economic, household and physical decision-making power. It also examines the influence of socio-economic factors on women empowerment. The empirical model chosen for this study is a Binary Logistic Regression Model. To estimate the model, data has been collected from 65 women entrepreneurs who receive loan from RAKUB. The model has been estimated applying the STATA. Both results show that improved access to income generating activities increases women's power in the household. This study highlights why women are lagging behind men in ethical terms. Ethics or a moral value permits an equal treatment among all people. So the degradation of women's status in the household is beyond the ethical norms. Authors conclude that more and special efforts should be made by government for women's empowerment in real term. They concludes that bank credits should be given to women in easy terms so that they can reduce their dependency on men through involvement in income generating activities and spend freely their income and thereby play a greater role in household decision-making and finally increase their awareness about social issues.*

\* M.S.S. Student, Department of Economics, University of Rajshahi

\*\* Lecturer, Department of Economics, University of Rajshahi

\*\*\* Professor, Department of Economics, University of Rajshahi

### **Introduction**

Women in Bangladesh constitute half of the total population. So, without an active and significant participation of female economic development is not possible. Women activities in our country are confined within their household activities and family rituals including taking care of their children and husbands. They are always neglected and treated as weak and dependent on their men. So, the development of women entrepreneurship is the most challenging phenomenon. MIDAS (2009) examined that at present women entrepreneurs constitute less than 10% of the total business entrepreneurs in Bangladesh, whereas women in advanced market economies own more than 25% of all businesses.

Women in Bangladesh can contribute substantially towards economic growth and empowerment. But they face many difficulties to start or run an enterprise due to lack of opportunities, many social barriers and domestic responsibilities. In order to express their creative potential as entrepreneurs specialized support and services are needed. So, it is very essential to study the role of RAKUB in the development of women entrepreneurship. Although specialized funds and programs have been given to facilitate micro-credit with more favorable conditions but in reality, entrepreneurs face collateral problem to guarantee loan repayment in most of the cases. Majority of the women are poor and they have no assets. So, they cannot offer the securities against loans. Due to this, women entrepreneurs in Bangladesh face many complexities.

Moreover, still many banks don't give loan to women because they feel in-secured. In most cases women are deprived of the property rights in our society. In many cases, their husbands take their money to start their own businesses and women are dependent on them. Many families still don't support women entrepreneurship and restrict women from starting and running their economic activities. But the development of overall socioeconomic progress depends on the empowerment of women entrepreneurship. Women have no economic development, they have no empowerment and so they are dominated by men in every sphere of life.

It is one of the fundamental ethical issues that women are lagging behind men. Both ethics and economics concerned with human well-being and about how we ought to act. Ethics studies values and virtues. A value is a good to be achieved or a standard of right to be followed, while a virtue is a character trait that enables one to achieve the good or act rightly. Ethical issues connect intimately with economic issues. Ethics and economics have a trouble relationship. The public is generally under the impression that ethics is about being "nice" or "fair" to other

people, while economics is about the machinery of translating individual selfishness into general wealth.

Ethics or moral philosophy is a branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong conduct. The term *ethics* derives from the Ancient Greek word ἠθικός *ethikos*, which is derived from the word ἥθος *ethos* (habit, “custom”). The branch of philosophy axiology comprises the sub-branches of ethics and aesthetics, each concerned with values. Economics is an ethical science, an important branch of applied moral philosophy. For it concerns how to understand, manage and fulfill the heterogeneous and often conflicting values, interests, and capacities of large numbers of individuals operating within the constraints of limited resources in a particular community.

That system-level attention to the key aspects of heterogeneity, conflict, and scarcity within a community should be a central concern of moral philosophy, but it generally isn't. Most moral philosophy focuses instead on different kinds of question: meta-ethics concerns the ultimate nature and meaning of ethics; normative ethics is about articulating theories of the right and the good, like utilitarianism or deontology; and applied ethics is focused on the rights and wrongs of controversial issues, like abortion or animal testing. As a branch of philosophy, ethics investigates the questions “What is the best way for people to live?” and “What actions are right or wrong in particular circumstances?”

In practice, ethics seeks to resolve questions of human morality, by defining concepts such as good and evil, right and wrong, virtue and vice, justice and crime. As a field of intellectual enquiry, moral philosophy also is related to the fields of moral psychology, descriptive ethics, and value theory. Under capitalism women empowerment is impossible but under socialism it is possible. For example, if we look at our cabinet there is a little number of women similarly in the parliament, number of women is only a few. Although prime minister, opposition leader, BNP chairperson, speaker are all women but it doesn't necessarily mean that women are really empowered in our society.

### **Justification of the Study**

Women have fewer opportunities for education and employment than men. By ensuring women's participation in skills development programs, it is possible to bring more women to light and make optimum utilization of our human capital and women empowerment. Only 22% of our active labor force is women where men women ratio in the country is almost at par (i.e. 104 men for every 100 women). Identifying new venture ideas through SMEs, women is getting involved

in diversifying the basket of exportable products and services will also contribute to creating jobs and entrepreneurship opportunities for women and for this reason they are playing a significant role in their family and social life.

But women's entrepreneurship is not an easy task, it is a challenging issue. At present, government and Bangladesh Bank give emphasis to give loan to women. Though Rajshahi Krishi Unnayan Bank (RAKUB) started to give loan to promote women entrepreneurship and empowering women, but in respect of getting loan their involvement is very low. Because women entrepreneurs face lack of capital, lack of proper training facilities, and lack of business data, collateral requirements and complex banking procedures. They are not treated equally and face discrimination in their everyday life.

Though women empowerment is one of the fundamental goals of our constitution five-year plans but for the effective implementation still there a very long way to go. Hence, a simple ethical norm does not permit such a grave situation to prevail. Basis of any empowerment lies in economic opportunities from which our women are miserably deprived. In this article an attempt has been made to change the situation. All these have dictated us to choose the topic "The Role of RAKUB for the Empowerment of Women Entrepreneurship" as the object for our research.

### **Objectives**

The present study focuses on the status of women entrepreneurs and a problem faced by them in taking loan from RAKUB as well as suggests some policy recommendations. The specific objectives of the study are:

- a) To analyze the socio- economic characteristics of women entrepreneurs;
- b) To assess women empowerment in relation to intra-family decision making process;
- c) To estimate the strength of impacts of different socio-economic factors on women's empowerment;
- d) To identify the problems and make some policy recommendations for the development of women entrepreneurship.

### **Research Methodology and analytical framework**

Methodology is a blueprint of all research. Methodology is the systematic and theoretical analysis of the methods. It is the general research strategy that outlines the way in which research is to be undertaken and, among other things, identifies the

methods to be used in it. These methods described in the methodology, define the means or modes of data collection or, sometimes, how a specific result is to be calculated (Wikipedia, 2016). Methodology based on the objectives of the research. This study has specified a dependent and independent variables for their casual relationship.

### **Methods**

Rajshahi Krishi Unnayan Bank (RAKUB) has been selected for this study because of its establishment, area of operation, experience, and diversified functional coverage. This study selected purposively two branches of RAKUB in Rajshahi, mainly Rajshahi branch and Binodpur branch. Because of the time, ability and mainly the budget constraints of the researcher have permitted to accomplish the research in this sample area.

An attempt has been made to find the gaps between demand for financial support of women entrepreneurs and its supply by RAKUB. To complete the study empirical quantitative and qualitative data have been collected. Primary data were collected using a range of techniques such as face- to- face interview and informal discussion. A sample of 65 women entrepreneurs have been selected by random sampling method from two branches of RAKUB. All data about women entrepreneurs were collected through face- to- face interview. Secondary data have been collected from the books, articles, journals, different websites, annual reports, and also from Rajshahi Krishi Unnayan Bank (RAKUB).

### **Analytical Framework**

To achieve the objectives, all the methods that are applied in the study are presented in this section. Some econometric and statistical tools, data analysis and presentation are discussed respectively. The present study has also tried to measure the empowerment of women entrepreneurship. Women empowerment depends on some capabilities which are:

- i. Having household decision-making power
- ii. Having economic decision-making power
- iii. Having freedom of physical movement

In the present study, women empowerment has been measured using three capabilities. To do this, the following index has been used.

Women Empowerment = (Economic decision-making power + household decision making power + freedom of physical movement)

The extent of economic decision-making power, household decision making power and freedom of physical movement of women are measured using five points Likert scale. In case of measuring each, three statements are used. Five-point Likert scale has been ranged from 1 = very low to 5 = very high. The respondents were asked to rank each item as 1 = very low, 2 = low, 3 = moderate, 4 = high, 5 = very high. The index for measuring each power could be written mathematically as:

$$I_{Ei} / H_i / P_i = \sum_{i=1}^{n_i} \sum_{j=1}^d P_i S_j$$

Where,  $I_{Ei}$  is used to refer economic decision-making power of  $I^{\text{th}}$  women.  $P_i$  is used to ask women to opinion about each of the three indicators of economic decision-making power. A value of 1 is assigned for each indicator where the women have positive capability and 0 otherwise.  $S_j$  is used to score the capability. A rate of 1 is assigned for very low capability and 5 for very high capability. The higher value of the index indicates the very high capability and very lower value of the index indicates the very low capability. Similarly,  $I_{Hi}$  and  $I_{Pi}$  are used to refer household decision making power and physical decision-making power.

### Logistic Regression Model of Women Empowerment

In this study, logistic regression model is used to estimate the relationship between empowerment and socio-economic variables. The binary logit model is also used because the dependent variable is a dummy variable which cannot be quantified (Ali & Noman, 2013). The econometric model is specified to facilitate the test of hypothesis that whether explanatory variables influence women empowerment.

The logit form of the women empowerment function is written as

$$L_i = \ln \left( \frac{P_i}{1-P_i} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu_i$$

Where,  $L_i$  is the log odds of women being empowered;  $\beta_1$  to  $\beta_8$  are coefficients or parameters that are estimated;  $X_1$  to  $X_8$  are explanatory variables which affect women empowerment status.  $\beta_0$  is the intercept term and  $\mu_i$  is the stochastic disturbance term. Here,  $X_1$  = Education (Years of schooling),  $X_2$  = Age (Years),  $X_3$  = Marital status (Married = 1 and Unmarried = 0),  $X_4$  = Income (Tk. Per month),  $X_5$  = Experience (Years),  $X_6$  = Training (Yes = 1 and No = 0).

The women empowerment model cannot be estimated by using standard regression technique due to the dichotomous nature of the dependent variable. In that case, logistic regression technique is employed to estimate the determinants of the women empowerment. Logistic regression explains the relation between



dependent variable and one or more explanatory variables. The logistic regression model suffers from heteroscedasticity and non-normality problem in the error term (Sarkar, 2004). In this case, maximum likelihood method is used to estimate the parameters of logistic regression model. In the logistic regression model, the coefficient of determination (R-square) which is widely used measure of the degree of overall fitting of the regression line is not meaningful in binary regressed models. Therefore, the Pseudo R-square or McFadden  $R^2$  is used to see the fitting of the model (Gujarati, 2003). This estimation is done using the econometric software package Stata 11.

### **Socio-economic characteristics of women entrepreneurs**

This study discusses the socio-economic characteristics of women who have received loan from RAKUB and are running their trade/ business. There are many respondents who are varied by their characteristics. It is not same for all respondents because of their different socio-economic characteristics or status.

### **Age of Entrepreneurs**

The age of the women entrepreneurs is important determinant for generation and accumulation of assets. Because young women can apply her dedication, eagerness, consciousness and motivation for achieving her target successfully. Among women entrepreneurs who are interviewed, most of the respondents are in the age group of 31-40 years. It is found that people within the age 25 to 45 years are most active and motivated toward work. The table 1 shows 3.1% of women are in below 20 years and 41 to 50 years women's are 29.2% and above 50 years 10.8% of the respondents.

*Table1: Distribution of Respondents by their Age*

Age 1	Frequency 2	% of total 3
Below 20	2	3.1
21-30	8	12.3
31-40	29	44.6
41-50	19	29.2
Above 50	7	10.8
Total	65	100.0

Source: Field

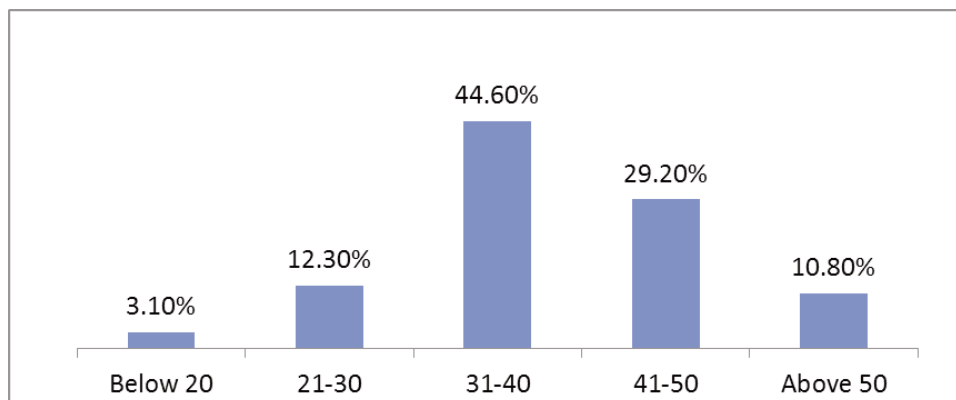


Figure1: Distribution of Respondents by their Age

### Educational Qualification of the Respondents

From table 2 it is shown that 1.5% respondents are illiterate, they cannot put up sign. Again 21.5 % of the respondents can sign only they have no formal education. It is found that 26.2% household study up to primary level, 27.7% respondents passed SSC and only 9.2% passed HSC. It is also found that 13.8% women study up to master's degree. This is shown by the chart 2.

Table 2: Distribution of Respondents by Educational Qualification

Educational Qualification	Frequency	% of Total
1	2	3
Illiterate	1	1.5
Can sign only	14	21.5
Primary	17	26.2
SSC	18	27.7
HSC	6	9.2
Masters	9	13.8
Total	65	100.0

Source: Field Survey

### Marital status

From socio-cultural perspective in Bangladesh, marital status is also an important factor in performing business. Table 3 shows that among 65 respondents, 83.1% are married, 4.6% are unmarried, 1.5% is divorce, and 10.8% are widow. Married entrepreneurs generally face wide range of problems but our result shows that 83.1% female entrepreneurs run their businesses and it is a good sign.

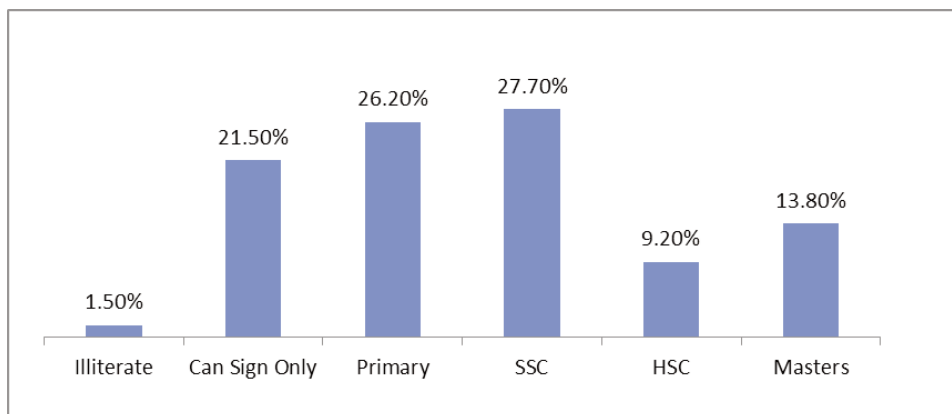


Figure 2: Distribution of Respondents by Educational Qualification

Table 3: Distribution of Respondents by Marital Status

Marital Status	Frequency	% of Total
1	2	3
Married	54	83.1
Unmarried	3	4.6
Divorced	1	1.5
Widow	7	10.8
Total	65	100.0

Source: Field Survey

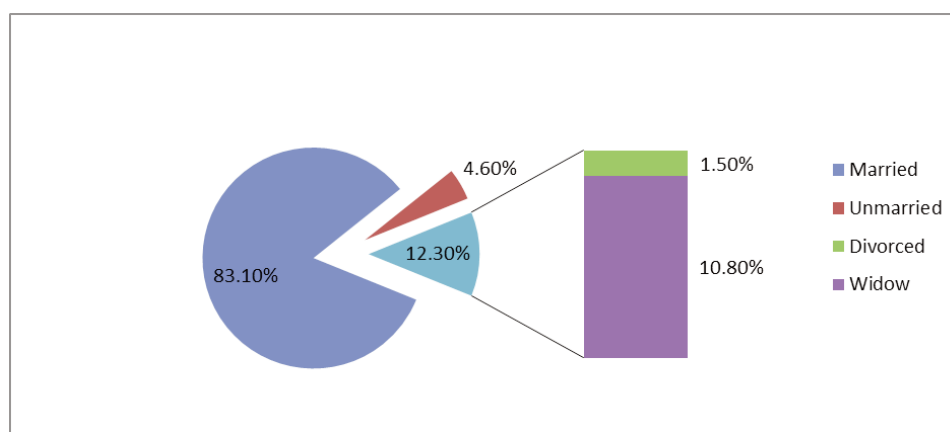


Figure 3: Distribution of Respondents by Marital Status

### Type of Family

From the interview, it is found that 67.7% of the respondents are belonging to the single family and only 32.3% are belonging to the joint family. This is shown in table 4.

Table 4: Distribution of Respondents by Type of Family

Type of family	Frequency	% of Total
1	2	3
Single	44	67.7
Joint	21	32.3
Total	65	100.0

Source: Field Survey

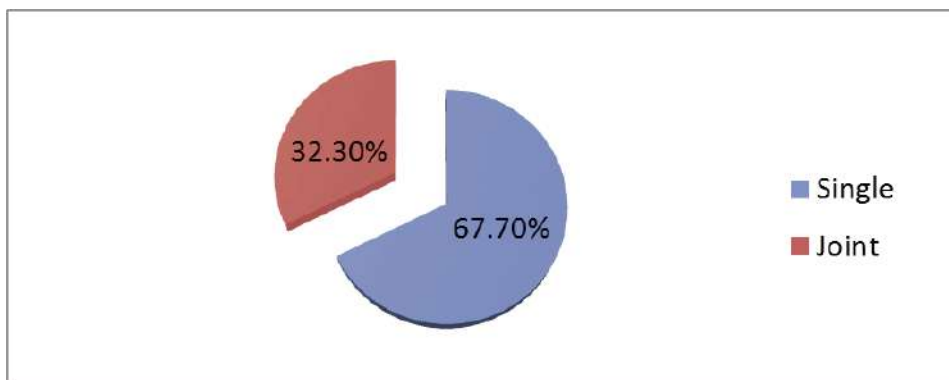


Figure-4: Distribution of Respondents by type of Family

### Type of House

Most of the respondents have pucca house that is 41.5% are living in pucca house and 29.2% have tin-shed house. 26.2% of the respondents have semi- pucca house and 3.1% have soil made house.

Table 5: Distribution of Respondents by their Type of House

Type of House	Frequency	% of Total
1	2	3
Soil made	2	3.1
Tin-shed	19	29.2
Semi-pucca	17	26.2
Pucca	27	41.5
Total	65	100.0

Source: Field Survey

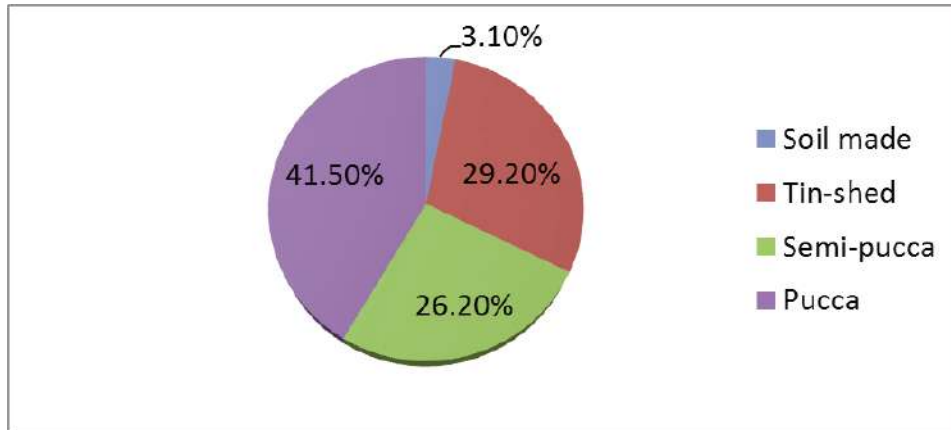


Figure 5: Distribution of Respondents by their Type of House

### Main Earning Member of the Respondents

Though women are being self- employed, the percentages of the main earning member of the respondents are still very low. Only 12.3% women are the main earning member of their own family. 60.0% of the main earning member is respondent’s husband and 23.1% both the respondent and husband are the main earning member of their family.

Table 6: Distribution of Respondents by Main Earning Members

Main Earning Member	Frequency	% of Total
1	2	3
Respondent	8	12.3
Husband	39	60.0
Father	3	4.6
Respondent + Husband	15	23.1
Total	65	100.0

Source: Field Survey

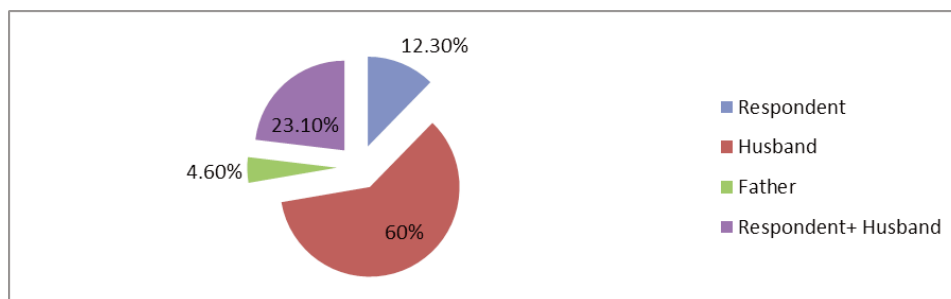


Figure 6: Distribution of Respondents by Main Earning Member of their Family

### Present Occupation of the Respondents

Women entrepreneurs are distributed into five sectors such as trade, production, service, handicraft, computer/ sewing training. Most of the entrepreneurs are related with production. Table 7 demonstrates that 61.5% respondents belong to the production sector, 9.2% to the trade sector, 7.7% and 29.2% are related to service and handicraft respectively.

Table 7: Distribution of Respondents by their Present Occupation

Present Occupation 1	Frequency 2	% of Total 3
Trade	6	9.2
Production	40	61.5
Handicraft	19	29.2
Total	65	100.0

Source: Field Survey

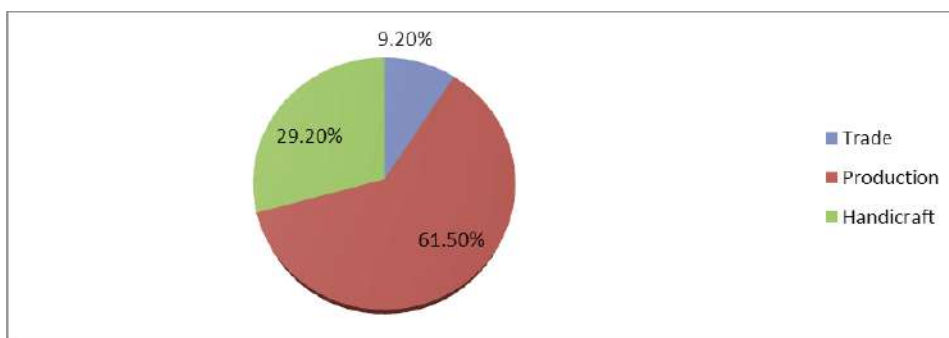


Figure 7: Distribution of Respondents by their Present Occupation

### Motivational Factors of the Respondents

Most of the entrepreneurs are motivated for poverty. Poverty is the push factor for their self-employment and there are many pull factors that also motivated women to work. About 44.6% respondents are motivated for their poverty, 23.1% are to be self-employment and 18.5% are motivated to bring high income. This is shown in table 8.

*Table 8: Distribution of Respondents by their Motivating Factors*

Factors 1	Frequency 2	% of Total 3
Personal choice	3	4.6
Poverty	34	52.3
Self-employment	15	23.1
Bring high income	12	18.5
Family tradition	1	1.5

Source: Field Survey

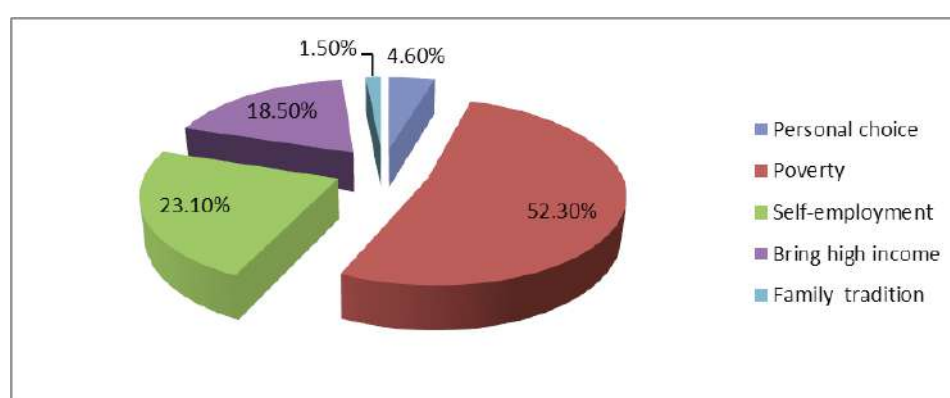


Figure 8: Distribution of Respondents by their Motivating Factors

### Sources of Initial Fund

From the study, it is observed that, most of the respondents collect their initial funds by their own saving. About 36.9% of the respondents collect their initial fund by her own saving, then they take loan from any bank or NGOs that is 29.2% women receive loan from bank or NGOs. The survey found that 20% are financed by family and 10.8% women borrow from relatives, 3.1% respondents started their activities by both taking loan and own saving.

*Table 9: Distribution of Respondents by their Sources of Initial Fund*

Collection of Initial Fund 1	Frequency 2	% of Total 3
Loan	19	29.2
Financed by family	13	20.0
Own saving	24	36.9
Borrowed from relatives	7	10.8
Loan+ Own saving	2	3.1
Total	65	100.0

Source: Field Survey

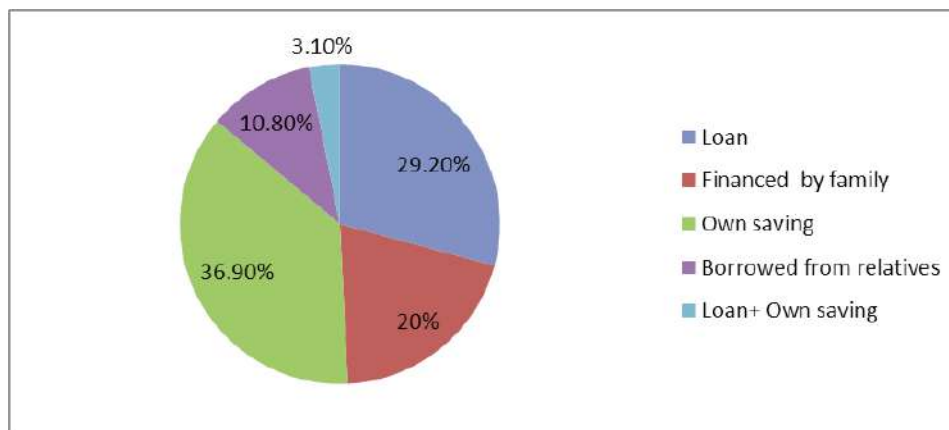


Figure 9: Distribution of Respondents by Sources of Initial Fund

### Living standard

Living standard represents the vital status of women that has changed frequently. After taking loan living standard of the respondents has change a lot. About 27.7% respondents' living standard have changed very highly and 26.2% living standard has changed moderately. As it is found that 20% respondent's living standard have changed highly, 16.9% have changed slightly and 9.2% respondent's living standard have not changed.

Table 10: Distribution of Respondents by their Living Standard

Living standard	Frequency	% of Total
Very high	18	27.7
High	13	20.0
Moderate	17	26.2
Few	11	16.9
Nothing changed	6	9.2
Total	65	100.0

Source: Field Survey

### Experience of the Respondents

Experience on selected business can help to run their businesses more perfectly. An experienced women can tackle ups and down of their business. It is seen that 95.4% respondents have some prior experience that means they act according to their previous experience and 4.6% respondents have no experience.



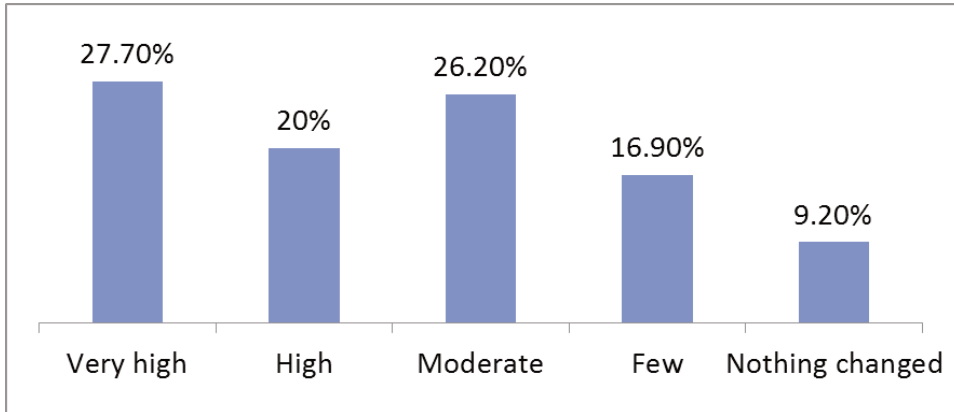


Figure 10: Distribution of Respondents by their Living Standard

Table 11: Distribution of Respondents by Experience on their work

Comments	Frequency	% of Total
1	2	3
Yes	62	4.6
No	3	95.4
Total	65	100.0

Source: Field Survey

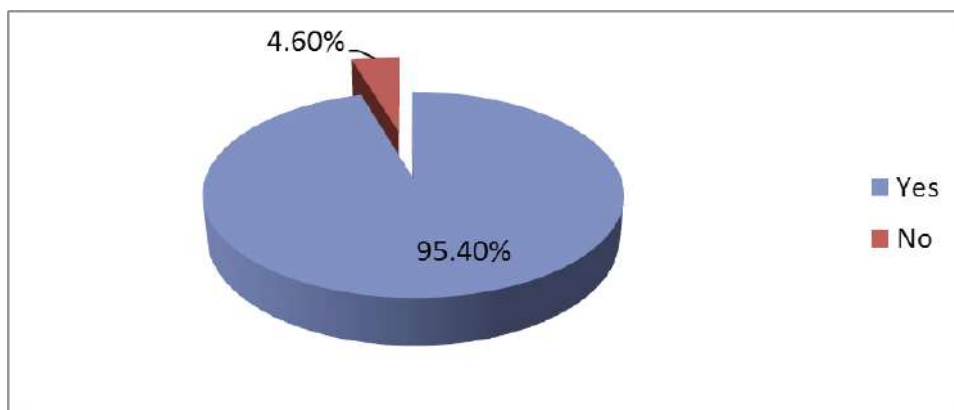


Figure 11: Distribution of Respondents by Experience on their Work

### Training

Training makes anyone more active and perfect in her activities. The main aim of training is to make more efficient, and she can work more efficiently. As a result, her income increases than before and make more concerns about work.

Table 12: Distribution of Respondents by Training

Comments	Frequency	% of Total
1	2	3
Yes	54	83.1
No	11	16.9
Total	65	100.0

Source: Field Survey

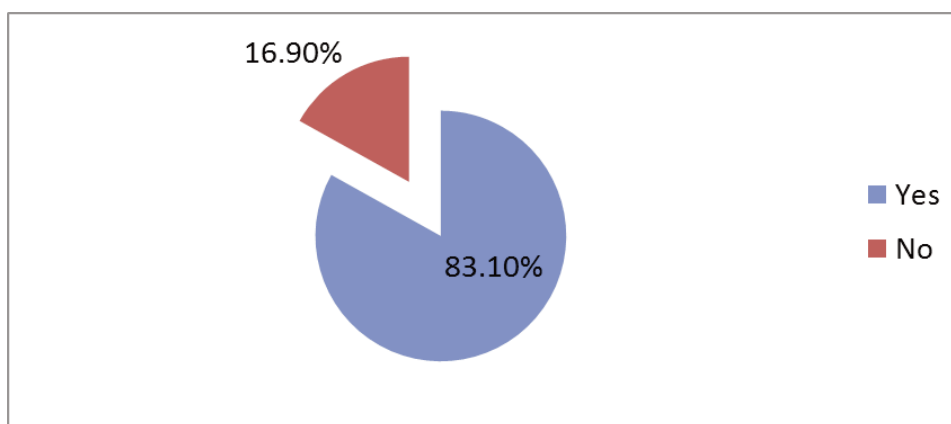


Figure 12: Distribution of Respondents by Training

Table 12 shows that, most of the respondent receive training (83.1%) and efficiently run their activities and 16.9% respondent did not receive training.

From the above discussion it can be said that the socio-economic condition of the women entrepreneurs in Rajshahi after taking loan from RAKUB is improving. Income and expenditure increased substantially. Family size gradually decreased so that people can spend large portion of their income for education and health purposes. So, the improved living standard of the women entrepreneurs will help to run their business or economic activities efficiently.

### Results and Discussions

To assess empowerment of women there are mainly three indicators were used economic decision-making power, household decision making power and physical movement. These three indicators make the women empowerment index.

### **Economic Decision-Making Power**

It is seen that 40.1% women entrepreneurs have very low and low, 44.5% have moderate and 15.4% have high and very high economic decision-making power.

*Table 13: Economic Decision-Making Power*

Degree	Absolute Value of Index	Frequency	Percentage
1	2	3	4
Very low and low	3-6	26	40.1
Moderate	7-9	29	44.5
High and very high	10-15	10	15.4

Source: Field Survey

### **Household Decision Making Power**

The above table shows that 18.5% women entrepreneurs have very low and low, most of them have moderate household decision making power and 24.6% of them have very high and high household decision making power. It means that majority of the women entrepreneurs are empowered through developing their own economic status.

*Table14: Household Decision Making Power*

Degree	Absolute Value of Index	Frequency	Percentage
1	2	3	4
Very low and low	3-6	12	18.5
Moderate	7-9	37	56.9
Very high and High	10-15	16	24.6

Source: Field Survey

### **Physical Movement Power**

Women are bound in every spheres of life; they cannot go anywhere as they want. But in modern day, their conditions are improving. Now they are free to move anywhere alone or with someone. Our study has shown that 23.1% women entrepreneurs have low and very low power, 47.6% women have moderate and 29.2% women have very high and high physical movement power.

*Table 15: Physical Movement Power of women*

1	Degree	Absolute Value of Index	Frequency	Percentage
		2	3	4
	Very low and low	3-6	15	23.1
	Moderate	7-9	41	47.6
	High and very high	10-15	19	29.2

Source: Field Survey

### Women Empowerment Index

Women empowerment index is obtained from average value of the three indicators such as economic decision-making status, household decision making status and physical movement status of women entrepreneurs. The below table discusses about the women empowerment index. The minimum value is 3 and maximum value is 15. It has been shown that 27.6% women have low and very low women empowerment, 55.5% have moderate empowerment and 17% have very high and high empowerment.

*Table 16: Women Empowerment Index*

1	Degree	Average value of index	Frequency	Percentage
		2	3	4
	Very low and low	3-6	18	27.6
	Moderate	7-9	36	55.5
	Very high and high	10-15	11	17.0

Source: Field Survey

### Estimation Results for Logit Model

Estimation results for the Logit model are provided in below table. It is easy to understand the overall impact of different factors on women empowerment status.

From table 17, it is found that the education of women entrepreneurs is statistically insignificant and but the coefficient of education variable has the positive sign. The estimated coefficient of education variable is 0.0024699. The odd ratio of education is 1.00 which indicates that the odd ratio in favor of respondents being empowered increased by 1.00 as the average education level of women entrepreneurs increases by 1 unit.

The age is insignificant but it has expected positive sign. The estimated coefficient of is 0.034184. The odd ratio of age is 1.03 which is positively insignificant. The

Table 17: Logistic Regression Analysis of the Socioeconomic Variables on Women Empowerment

Variables	Coefficient	Odds Ratio	Std. Error.	z	P> z
1	2	3	4	5	6
Education	0.0024699	1.002473	0.1112222	0.02	0.982
Age	0.034184	1.034775	0.0563952	0.63	0.531
Marital Status	2.637531**	13.97865	16.27786	2.26	0.024
Income	0.0001423**	1.000142	0.0000687	2.07	0.038
Experience	-0.0697387	0.9326375	0.048052	-1.35	0.176
Training	2.888797***	17.97167	14.52858	3.57	0.000
Constant	-5.091342	-	2.476748	-2.06	0.040
LR chi2(6) =	26.91	Pro> chi 2 = 0.0002		Pseudo R2 = 0.3509	
Log likelihood =	-24.894643	Total observations = 65			

Note: \*\*\*Significant at 1%, \*\*Significant at 5% and \*Significant at 10%

Source: Author's Own Estimation, August 2016

odd ratio in favor of respondents being empowered increases by 1.03 as the average age of respondents increases by 1 year.

The marital status is significant at 5% level. The coefficient of marital status variable is 2.637531. The odd ratio of marital status is 13.98 which are positively significant at 5% level of significance. Which indicates that for a unit increases in marital status, the log-odds ratio in favor of women empowerment goes up by 13.98.

The income variable is significant at 5% level. The estimated coefficient of income variable is 0.0001423. The odds ratio of income is 1.00 which suggests that a unit increases in income, the log-odds of empowerment of women increases by 1.00.

The experience variable is insignificant and the coefficient of experience variable is -0.0697387. The odd ratio of experience variable is 0.93 which suggests that a unit increases in experience, the log-odds of empowerment of women reduced by 0.93. The result reveals that experience is negatively related to empowerment of women.

The training variable is significant at 1% level of significance. The coefficient of training variable is 2.888797. In case of training, the odd ratio is 1.97 which suggests that for a unit increases in training; the log-odds ratio in favor of empowerment of women goes up by 17.97. In that case, the empowerment would increase with the training.

### **Problems and Constraints Faced by Women Entrepreneurs**

In Bangladesh, there are various problems and constraints to women entrepreneurship development. Though various banks and NGOs give financial support to run their business but they are not given in easy terms even social and family barriers are also responsible for their backwardness

#### **Social and Religious Restriction**

Women are very much abided by cultural barriers, norms and customs. They are restricted by religious and social customs. These are not helpful for the development of women entrepreneurs. Because, the restricted social norms do not always allow them to go outside their home and to be involved in different entrepreneurial activities.

*Table 18: Social and Religious Restriction*

Restrictions	Frequency	Percentage
1	2	3
Very Much	11	16.9
Much	29	44.6
Average	10	15.4
Less	8	12.3
No Restriction	7	10.8
Total	65	100.0

Source: Field Survey

From the above table, 16.9% of the women entrepreneurs face very many restrictions in doing their activities, 44.6% face many religious and social restrictions and 15.4% of them face average restrictions. The remaining 12.3% women face less restriction and 10.8% face no restrictions for doing entrepreneurial activities.

#### **Dominated by Male**

Male-dominant Society is another barrier to women. Men think that they are born to be free and they can do anything they want. They also think that women are born to be bondage; they should be confined within household activities. So, in a male-dominated society, men dominate the women. Almost 63.1% of the women entrepreneurs dominated by male and 36.9% are not dominated by their male members.

*Table 19: The Number of Respondents Dominated by Male*

1	Comments	Frequency	% of Total
		2	3
	Yes	41	63.1
	No	24	36.9
	Total	65	100.0

Source: Field Survey

### **Problem of Finance**

The women entrepreneurs have faced initial or venture capital problem to start their enterprises. Financial constraint is the biggest problem to do entrepreneurial activities. Many banks and other financial institutions come forward to give finance to women entrepreneurs but there is another problem arises when they apply for loan. Most of the entrepreneurs that is 90.8% face financial problem for starting their business and 9.2% are not faced this kind of problem.

*Table 20: Problem of Finance Faced by Women Entrepreneurs*

1	Problem of Finance	Frequency	% of Total
		2	3
	Yes	59	90.8
	No	6	9.2
	Total	65	100.0

Source: Field Survey

### **Marketing Problem**

Marketing of the products is also a major problem for these women entrepreneurs. They do not know the actual price of the product. It is found that 61.5% women entrepreneurs face marketing problem and 38.5% of them are not face marketing problem say about transport, price, and other kind of product they produced.

*Table 21: Marketing Problem Faced by Women Entrepreneurs*

1	Comments	Frequency	Percentage
		2	3
	Yes	40	61.5
	No	25	38.5
	Total	65	100.0

Source: Field Survey

### Market Information

Women entrepreneurs very often do not get any information about market because their no physical movement. 55.4% respondents get full information about the price of their products and 44.6% respondents do not get the available information about their products.

Table 22: Market Information about the Products

1	Comments	Frequency	Percentage
1		2	3
	Yes	36	55.4
	No	29	44.6
	Total	65	100.0

Source: Field Survey

### Problem of Collecting Raw Materials

The collection of raw materials is very difficult for women. Because they face transportation problem and they are not allowed to freely move outside alone. Financial problem has been faced by 46.2% women entrepreneurs, 16.9% face price problem and 7.7% of women face quality problem. The study found that 24.6% of the women entrepreneurs face transportation problem and only 4.6% face scarcity of the raw materials.

Table 23: Problem of Collecting Raw Materials

1	Problems of Raw Material	Frequency	Percentage
1		2	3
	Financial Problem	30	46.2
	Increased Price	11	16.9
	Unsuitable Quality	5	7.7
	Scarcity	3	4.6
	Transport	16	24.6
	Total	65	100.0

Source: Field Survey

### Transportation Problem

Transportation problem is one of the biggest problems in Bangladesh especially for women. This problem also affects the entrepreneurial activities of women. It is seen that 78.5% of women face transportation problem and only 21.5% of them are not faced transportation problem in selling products and collecting raw materials.



*Table 24: Transportation Problem faced by women entrepreneurs*

1	Comments	Frequency	% of Total
1		2	3
	Yes	51	78.5
	No	14	21.5
	Total	65	100.0

Source: Field Survey

### High Rate of Interest

The women entrepreneurs in Bangladesh face high rate of interest. Most of the women entrepreneurs said that the interest rate of Rajshahi Krishi Unnayan Bank (RAKUB) is high that is 13% for women entrepreneurship. The study has shown that 33.8% of the respondents said the interest rate is overate in RAKUB and 12.3% said justified, 16.9% said moderate rate of interest.

*Table 25: High Rate of Interest Faced by Women Entrepreneurs*

1	Rate of Interest	Frequency	% of Total
1		2	3
	Overate	22	33.8
	Justified	8	12.3
	Moderate	11	16.9
	Comparatively Less	9	13.8
	Comparatively High	15	23.1
	Total	65	100.0

Source: Field Survey

### Mortgage for Taking Loan

The land mortgage problem of taking loan is the main barrier to the process of women entrepreneurs. They face many difficulties for taking loan from the bank. The majority of the entrepreneurs face mortgage problem in taking loan. We have found that 66.2% respondents face mortgage problem and 33.8% face no mortgage problem.

*Table 26: Mortgage Problem for Taking Loan*

1	Mortgage	Frequency	% of Total
1		2	3
	Yes	43	66.2
	No	22	33.8
	Total	65	100.0

Source: Field Survey

### Conditions of Taking Loan

From the table, 44.6% face mortgage problem, 13.8% face signature of known person, and 32.3% of the women face both the mortgage and signature problem. It is found that 3.1% face account problem and 6.2% of the women entrepreneurs face trade license problem.

*Table 27: Difficult Conditions of Taking Loan*

Conditions of Getting Loan 1	Frequency 2	% of Total 3
Mortgage	29	44.6
Signature of Known Account	9	13.8
Trade license	2	3.1
Mortgage+ Signature	4	6.2
Total	21	32.3
	65	100.0

Source: Field Survey

### Procedures for Getting Loan

The procedures for getting loan from any financial institutions are very much difficult. For this difficulty many women do not want to take loan for starting their business. So, the number of women entrepreneurs in Bangladesh is still remains small. Around 13.8% of the women entrepreneurs said that the procedures for getting loan is more easy, 15.4% said it is easy and most of them that is 36.9% said the procedure for getting loan from RAKUB is moderate. But 24.6% face difficulty and 9.2% of them face no difficulty for getting loan.

*Table 28: Complex Procedures of Getting Loan*

Procedures 1	Frequency 2	% of Total 3
More easy	9	13.8
Easy	10	15.4
Moderate	24	36.9
Difficult	16	24.6
No difficulty	6	9.2
Total	65	100.0

Source: Field Survey

### Limitation of Credit

The limitation of credit is the main barrier to women activities. From field survey it is found that 10.8% women said that in RAKUB, there are very high limitations of credit, 27.7% said high limitation and 46.2% said that there is average limitation of credit facilities. Most of the women want to increase credit facilities.

*Table 29: Limitation of Micro-Credit faced by women entrepreneurs*

1	Limitation	Frequency	Percentage
		2	3
	Very High	7	10.8
	High	18	27.7
	Average	30	46.2
	Low	6	9.2
	Very Low	4	6.2
	Total	65	100.0

Source: Field Survey

### Delay in Sanction

Women are dominated in everywhere in our country. They are not empowered so that they are neglected. We have found that 20% women face very long time in sanction loan by RAKUB, 26.2% said it is high problem and 35.4% women said average delay in sanction loan.

*Table 30: Delay in Sanction Loan*

1	Delay in Sanction	Frequency	Percentage
		2	3
	Very high	13	20.0
	High	17	26.2
	Average	23	35.4
	Low	6	9.2
	Very Low	6	9.2
	Total	65	100.0

Source: Field Survey

### Lack of Training

Training program helps to gain knowledge to the overall business process and thus they can manage their business smoothly. But in Bangladesh women entrepreneurs are getting inadequate training facilities. The training program of

RAKUB for women entrepreneurs is satisfactory that is said 32.3% of the women. It is found that 12.3% said RAKUB give proper training, 24.6% said that training is not satisfactory and 30.8% women do not get any training from RAKUB.

*Table 31: Lack of Training*

Training	Frequency	Percentage
1	2	3
Proper	8	12.3
Satisfactory	21	32.3
Not Satisfactory	16	24.6
No Training	20	30.8
Total	65	100.0

Source: Field Survey

### **Policy Recommendations**

From the suggestions of women entrepreneurs in the field as well as from the overall findings of the study, we have made some policy recommendations for improving women entrepreneurship in Bangladesh. These are structured into three parts:

#### **Actions of Government**

- Special attention should be given to women entrepreneurship development. Special program needs to be taken to literate them and train the entrepreneurs for making them aware.
- Government should monitor the credit operations of various banks and NGOs through audit.
- Government should improve the infrastructure facilities by taking necessary step. Thus, this will certainly improve the socio-economic conditions of entrepreneurs.
- Government can arrange trade fair for exhibition of their products. This will create marketing support for introducing and selling products.

#### **Social Attitudinal Recommendations**

- It is necessary to change social attitude towards women's operation. Rigid social norms, values and attitude act as major barrier to the development of women entrepreneurship. Banks and NGO are working for their development by providing essential credit facilities.

- Entrepreneurship courses should be introduced into both the formal and informal education institutions in the country. It will empower them in every sphere of life.

#### **Bank- related Policy Recommendations**

- RAKUB should follow specific and integrated procedures to identify the right entrepreneurs.
- Loan should be provided on easy terms and conditions and loan application should be appraised as soon as possible.
- The guarantor problem should be reduced so that women can receive loan without any difficulty.
- The amount of credit should be increased without any collateral.
- Dedicated women desk headed by women officer because they hesitate to discuss on business and loans, they are harassed by male counterparts.

#### **Summary of the Findings**

In traditional society of Bangladesh women are considered as inferior member in their family. This misperception about women has been changing gradually in Bangladesh. They contribute in all sectors of the economy. They also play their role in the family and society thus they are empowered.

The researcher discusses various socio-economic status of women entrepreneurship. These are age, education level, marital status, main earning member of family; income and expenditure of respondents are analyzed in this section and fulfill the second objective. Descriptive statistics is used to analyze the socio-economic status of women entrepreneurs and their empowerment status. 44.6% women entrepreneurs are between 31-40 ages, most of them 27.7% complete SSC, 83.1% women are married, and 41.5% use pucca house. Thus their living standard changes frequently. The role of women entrepreneurs in the family increases very rapidly. From the field survey, most of the women now have moderate empowerment that is 55.4% because they are engaged in economic activities. But almost all of the women are not engaged in economic activities because they can't get suitable fund to run their business and thus they lose their position in the family. They are always neglected and treated as weak and dependent on men.

Ethics or moral philosophy does not permit this unfairness. Ethics is being "nice" or "fair" to other people in the society, while economic serves the individual for

the welfare of the society and thus these two objects are interconnected. Ethics fosters public awareness of those fundamental values and principles. They are the foundation on which the universal consensus on human rights is built. Human rights are the most tangible and legally binding expression of this ethical vision. In economic ethics, as in ethics in general, such fundamental values lead to virtues for individual attitudes and behavior. Moderation, care, and compassion lead to modesty instead of greed.

Transparency leads to honesty, and justice needs the virtue of courage. Responsibility means to respond to those who give the mandate and power to act: the entrepreneur to the shareholders, employees, and other stockholders; the politicians to the electorates; human beings to nature and its gifts. The level of responsibility has to correspond to the level of power, capacity, and capability. Those with more resources bear greater responsibility for resolving problems. Economic ethics is core risk management. Ethical enterprises often have lower risks and better performance than unethical or average companies.

Freedom of decision is a precondition for self-responsible behavior and entrepreneurial initiative. Justice/equity is based on the inalienable human dignity of all human beings and their equality independent of gender, race, religion, and intellectual or physical capabilities. Equity is an expression of the golden rule of mutuality (“Do to others as you would have them do to you”), which is common in all great value systems around the world. Participation is the ability to participate in the decision making of communities as an expression of personal freedom and dignity. Transparency is a precondition for many other values such as justice equity and fair participation and for overcoming white-collar crime.

There are various methodologies adopted for the present study and data analysis depicted in order to measure the relationship between women empowerment and different socio-economic variables and tried to achieve all objectives in this study. Firstly, to assess women empowerment in intra-family decision making women empowerment index is constructed by using three main indicators. Secondly, to analyze the women empowerment status with respect to age, education, marital status, income, training and experience, simple binary logistic regression model is used.

Among all these independent variables, marital status, income and training are statistically significant thus this fulfill the third objective. From the field study, we can see that the more the women are married and trained, the more they empowered. Similarly, in case of income, the more the income level of the women entrepreneurs, the more are they empowered because no money no empowerment.

Money ultimately brings empowerment among people. Other independent variables do not give significant result.

### **Conclusion**

The present study studies the factors that affecting the women empowerment. There are lots of problem in the development of women entrepreneurship but their probability are not few because women are the main driving force of an economy. The growth of women can signify the economic development of a country. The empowerment of whole women depends on the economic development of the women entrepreneurs. The empirical results support the conclusion that increased income alone is not sufficient to directly facilitate women's empowerment within the household in urban Rajshahi. Income is important, but relying on only women's access to income to facilitate their empowerment is not sufficient, social norms like women's social dependence on men needs to be considered as well in the context of our society.

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## Human Capital Development for Inclusive Growth and Shared Prosperity

MD. ANISUR RAHMAN\*

**Abstract:** *Advances in Artificial Intelligence and related fields have open up a new markets and opportunities for progress in critical areas such as health, education, energy, economic inclusion, social welfare and environment. AI driven automation will continue to create wealth and structural changes in the economy. World economy will transform towards knowledge based economy. Human capital development is essential mainly in the developing countries to stay relevant with the globalized economy for a shared prosperity.*

### Introduction

21<sup>st</sup> Century is the revolutionary century for the industrial revolution which we called the age of 4th industrial revolution. Global Value Chain has become the economy's backbone and central nervous system. The fragmentation of global value chain is fueled by technological, economical and social changes of the world.

Lower production cost can earn the higher profit in business. The global industrial leaders are moving through the world for the sophistication of their production system to reduce the production cost, which is the major factor for the production of goods to stay competitive among the competitors.

To reduce production cost, developed countries are using the technologies together at the different stages of production and their services like, Artificial Intelligence, Ultra intelligence, Next Generation Robotics, 3D Printing, Biotechnologies, Genetic Engineering Technologies, Nanotechnologies,

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\* Assistant Professor, Department of ICT, Daulatpur College, Kushtia, Bangladesh  
E-mail: arahmankst@gmail.com

Computer and Internet Technologies to transform manufacturing and production system to boost up the production speed and lessen the production and service cost.

In future, the use of sophisticated technology in production sector will help the industrialists to diversify the raw materials according to the requirement of the production process which is another system to reduce production cost and to stay risk free in competitive market.

In the future distribution system, the use of technology will impact upon the cost of goods and their services to reach at the user, the technologies are RFID, Drones, Driverless Trucks, Automated Warehouse etc., all in these sectors need very few human skilled labors.

The world **consumer** behavior has changed. The information about the products are very available and purchase of the products from anywhere of the world is very easy. The companies are directly involved with the global marketing are well informed about the customers demand, and they know very well about, how to do it, by analyzing the data and information about the customers.

So, a “New Paradigm Model” is very easy to apply for the industrially developed countries upon the developing countries, which will be a way of new thinking about consumption. Moreover in business, the idea is the same, a new way of looking at things.

### **Rapid Development of Automation, Digitalization and Artificial Intelligence**

AI is a looping of Thinking + Perception + Action by computer programming algorithm. Rapid development of automation and digitalization are creating changes in the nature of production and services over the world, which is a factor of 4<sup>th</sup> industrial revolution.

Automation is that, any country cannot hide them from this environment. Because in the present decade, it is an important part of global business. Almost all the countries of the world are connected with the internet for the transaction of their business, commerce, and various types of required information. The automation in home, institution and in business centers by different types of devices are increasing over the world. For the security purposes many organizations of the world are connecting with the internet. Now, it is a growing trend of the world that, most of the cars of the world are connected with the internet system for the security and advanced driving information.

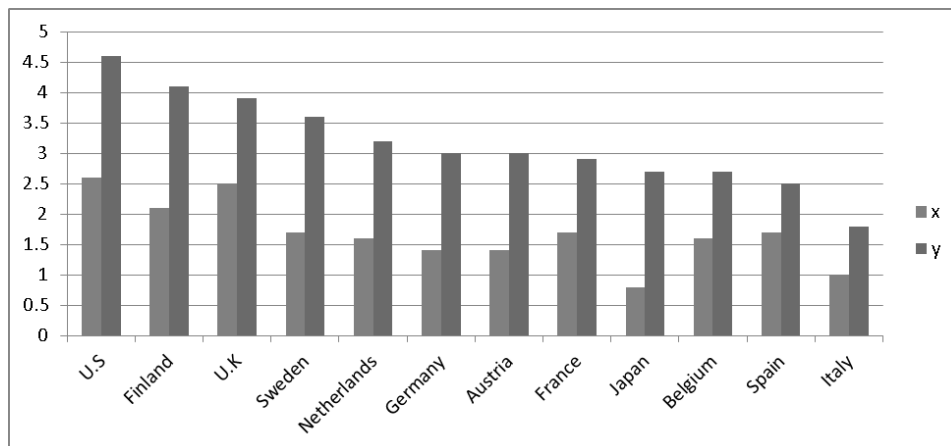
For automation, the world is rapidly depending upon computer and internet system. Which require a central computer system for data and information is called cloud computing. Cloud computing is going to be a big deal for the developed countries, because of its low-cost service, any time any place access and capacity of load sharing.

The growing trend of automation and internet of things is raising the question of internet security and employment. Moreover, the cloud computing is rising the question about the dependency upon the service provider and can limit the local innovation of the developing countries in computer sector.

In manufacturing, production and service sectors the industrialists are looking for the modern technologies to reduce the cost of their goods to stay competitive in the market and to maximize their profit. To stay risk free in the market, developed countries are using Artificial Intelligence and Robotic technology to increase their productivity, reducing the cost of goods and to maximize their profit.

The installation of robotics and artificial intelligence technology in production sector is much expensive. It is affordable for the developed countries but not for the developing countries. Accenture (a research organization) analyzed 12 developed economies that together generate more than 50 percent of the world’s economic output, and found that artificial intelligence has the potential to double their annual economic growth rate by 2035.

Figure 1: The Economic Impact of AI



Source: Accenture and Frontier Economics.

### **AI Will Change the Future of Job, Wage Inequality and Employment Polarization**

Almost every aspect of our daily life has become digitalized. Artificial Intelligence can utilize data to assist in many tasks what the world have never seen before. The world economy is entering in a new era in which artificial intelligence has the potential to overcome the physical limitations of capital and labor and open up new sources of value and growth. Artificial Intelligence has become another productivity enhancer. But when it will be a new factor of production will transform our thinking about growth.

The AI Growth Model:

This model adapts the traditional growth model by including AI as factor of production.

Traditional Growth Model: Capital + Labor + TFP = Growth

Adapted growth Model: Capital + Labor + TFP + AI = Growth.

AI as new factor of production it will drive the growth at least three important ways. **First**, it will create new virtual workforce. Where there require very few human labor. **Second**, it will enhance the skill and ability of the existing workforce. There will be required more skilled workforce in AI related field and will raise the possibilities of higher wage for the higher skilled workforce can create the income inequality more in comparison with the lower skilled workforce. **Third**, AI will drive the innovation. Because it has some overlap with almost all fields in that it offers the potential for broad application. Applications have already proven in such areas as medicine, law, manufacturing, economics, banking, biology, chemistry, defense, civil engineering and aerospace. AI will drive innovation, where it will viable for commercialization. There require the skilled workforce to do the particular AI related task. An employment polarization situation will take place to minimize the demand for high skill workforce and their wages also.

### **Human Capital Development Contributes to Innovations in the Knowledge Industry**

In a study at the University of Johannesburg, they saw that, artificial intelligence has been applied successfully to fill the gap that exists in information required to make informed decision. It is found to them, that the use of artificial intelligence machine changes the degrees in which the theory of bounded rationality, efficient market hypothesis and prospect theories are applicable.

Here, it is must to develop the human capital to make more efficient decision by combining human plus machine/artificial intelligence and to operate the decision algorithm.

Executive office of the president of the USA declared on December 20, 2016 about the Artificial Intelligence, Automation and the Economy. AI and related fields have opened up new market and new opportunities for progress in critical areas such as health, education, energy, economic inclusion, social welfare and environment. This will continue to create wealth. But the Americans have to take aggressive policy action to take full advantage of the AI driven automation, and to ensure their continued leadership in the creation and use of Artificial Intelligence.

With the over accelerating development of technology, the world is moving towards consumer economy to knowledge-based economy, which will transform the tangible assets into intangible assets and our world economic system will operate a new growth formula.

The growth formula is as follows:

$$IA > MI - \text{therefore} - IC + AI = W$$

Which translate into Intangible Asset (IA) is greater than Money Supply (MI) – therefore – Intellectual Capital (IC) plus Artificial Intelligence (AI) equals to Wealth (W).

While the tangible assets which are the physical assets of a company or a business will transform into Intangible asset based on that is not physical in nature but intellectual property such as patent, trade mark, copyright, business methodologies, goodwill and brand recognition. The creation of intellectual property depends upon the innovation skill and knowledge of the human capital of the organization. These will be greater than money supply because investment will always look for the new innovation and intellectual property for competitive advantage which have the business value.

Again, the intellectual capital is the intangible value of a business covering human capital it is the sum of everything, everybody in the company knows that gives it a competitive edge. Artificial Intelligence will add extra advantages upon the intangible property to make it more valuable intellectual capital and the addition of Artificial Intelligence technology with the intellectual capital for commercialization of goods and services will create wealth. Thus human capital development can contribute to innovation in the knowledge industry.

### **Automation and Digitalization in Business Service Sector**

The increasing importance of fragmentation of production that involves services. The fragmentation of production depends on a part is production value chain and other is on trade. Demand on ICT in business service sector is increasing globally. Where there need minimum investment and have the scope of maximum employment within short period of time. So that many developing countries are trying to take the advantages of service value chain, by developing their present skill set of manpower and providing them globally.

The increasing demand of digitalization in service sector for rapid transportation, distribution and services are causing the needs of skill development of workforces both in developing and developed countries according to the quality of goods and services. So, electronic infrastructure and human capital are the most important factor for the service value chain. According to the development of training and research capabilities, the developed countries are involving much in high tech production service sectors and the developing countries are involving mainly in the areas where there required lower wage services. So, the human capital development in the lower income countries of the Asian region can contribute to a higher wage area over the world.

### **Automation and Digitalization in Health Sector**

Advances in health sector of automation and digitalization is remarkable in the developed countries but in the developing countries still higher consultancy is not available for the poor people at their doorstep. So, there are many things to do to make a healthy nation by using automation and digitalization in this sector. Development of neurology and cancer detection by using computer technology has become a revolution in the 21<sup>st</sup> century.

### **Automation and Digitalization in Education Sector**

Automation and digitalization in education sector is the most prior sector in the world and mostly in the developing world for the up gradation of their national value in this sector by improving the computer skill of the students according to the global requirement for the preparation of future global requirement of skill workforces in this sector for better education and management.

### **The Skill and Knowledge Needed with the Rapid Advances of Digitalization, Automation and Artificial Intelligence**

Rapid development of digitalization and automation over the world in the period of fourth industrial revolution there need the extra skill workforce to operate these



devices, hardware and software. Digitalization is a system which mainly depends upon computer system, where we can input our data and information and it will produce the output as a result after processing these data and information inside the processing unit of the computer according to the computer digital programming. Digitalization is mainly used to take accurate decision by using the digital data and information stored from various sources into a central system from where the decision maker can take decision by using the different type of decision algorithm. This system can be distributed from home, country and around the world.

Automation is a system where the electronic devices are included with the computer system to become a part of digital system. And the computer system made an infrastructure where every aspect of our regular office institutional and home works are related with the computer system to made easy our daily works.

Artificial Intelligence is also called machine Intelligence displayed by machine in contrast with the natural intelligence, which displayed by the humans. Artificial Intelligence is mainly used for decision making where human are not much informed about the matter upon which he have to take decision and some where AI is efficient enough to take decision by using and analyzing the data and information. There are two arguments about decision making **first**, human intelligence is more efficient than machine /artificial intelligence **Second**, Machine/artificial intelligence is more efficient than human intelligence. Another argument in the world have developed by combining machine and human intelligence which can lead towards a more efficient and accurate decision making, for which a more efficient combination of knowledge is essential. This is,

AI+TECHNOLOGY+NEUROSCIENCE+ANTHROPOLOGY+PHILOSOPHY

So the peoples are related with the automation and digitalization system, must have the knowledge about the electronic devices compatible with the computer system, computer literacy, knowledge about computer, networking, knowledge about internet, knowledge about to use different type of data input, searching and decision making program.

As artificial intelligence is a machine intelligence and creates by the human mainly depends upon different type of algorithms are fit for different type of decision making. So the selection of the algorithm for the particular task for the best probable decision making can be influenced by the knowledge about Artificial Intelligence and technological advanced knowledge, Knowledge about

neuroscience about how the brain works in comparison with the machine, and to lead the machine, anthropological knowledge to select the appropriate algorithm fit for the users socially, philosophical knowledge for the development of the algorithms according to the local, national and global requirements for a beneficial findings to build up the algorithms more ethical for the world to balance the social and environmental factor for global sustainability.

### **Artificial Intelligence, Data Security and Fraud Detection**

Big data is the key for accuracy. Artificial Intelligence assists us in decision making by using data and information provided for decision making. In the coming days artificial intelligence system cyber attack is expected to cause an explosion of data theft, network penetration and spread of computer viruses. Which is already going on over the world. The developing countries should also be prepared by using or developing AI related skill and knowledge to counter the AI related cyber attack by using AI technology.

### **Militarization of Artificial Intelligence**

In the recent years the use of AI in military sector is increasing tremendously. Application of AI in drones, unmanned, land and air vehicles, robots and many other autonomous military weapons. Some are operated successfully and some are still under experiment. Many civilians, women and children had died in autonomous military operation over the world. The over accelerated development of AI in military equipments causing different types of threat for the global mankind and law of the war.

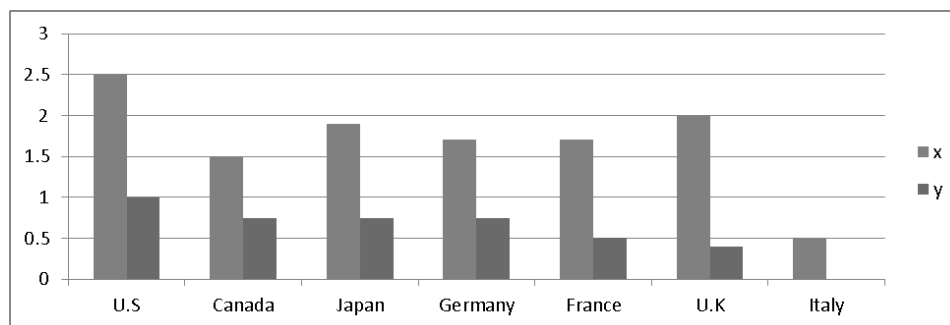
### **Artificial Intelligence, Economic Growth and Structural Change**

There are three main factors that drive the economic growth. **First**, accumulation of capital stock. **Second**, increase in labor inputs such as workers or hours worked. **Third**, technological advancement. A country's growth can be broken down by accounting for what percentage of economic growth comes from capital, labor and technology. The basis of economic development is process of continuous technical innovation leading to improve quality and the lower production cost for the same goods and a dynamic process of industrial upgrading and structural change with new and different goods and services produced continuously. Artificial Intelligence will play a vital role at the very near future. Because of its ability to create intangible asset, upon which new investment will made, where require AI related workforces and innovation.

Technology is the driver of productivity growth. Industrial Robotic automation alone increased labor productivity growth by 0.36 percentage point across 17 countries between 1993-2007.

The potential positive impact of AI driven automation on productivity is particularly important given recent trends in productivity. But productivity growth has slowed in 30 of the 31 advanced economies of the world. A considerable amount of slowdown in productivity growth in many countries including USA is due to slowdown of investment in capital stock.

**Figure 2: Labor Productivity Growth, g-7 Countries.  
(AI Driven Automation)**



Source: Conference Board, Total Economy Database; CEA Calculations.

Column 1: Percent, Annual Rate. From 1995-2005. Column 2: Percent, Annual Rate. From 2005-2015.

**Policies can Promote Human Capital Development with the Rapid Advances of Digitalization, Automation and Artificial Intelligence**

The development of human resource is to meet the requirement of the skill forces at the right time. Policy can play a significant role in shaping the direction and effects of technological changes. Given appropriate attention and the right policy and institutional responses, digitalization and automation can be compatible with productivity, employment and shared prosperity.

Artificial intelligence technique is rapidly growing in the production and service sector for increase productivity. In the near future there will require a skilled set of workforces in these sectors much. To supply the actual skill according to the demand of global production and service sector both the developing and developed countries must have a set of skilled workforces upon artificial

intelligence. Because it is already affecting the global production and service value chain which is not only for the developed countries but for the developing countries also. Developed countries are already taking advantages of artificial intelligence technique but the developing countries should also develop their workforces upon artificial intelligence technique. Though in the developing countries there are not yet have enough scopes for these high skill workforces but there are wide scopes of supplying these workforces globally. Developed countries which will make advantages for both the developed and developing countries to reduce the production cost of goods and scopes of employment for high skill workforces.

1. Computer skill and program development is going to be an essential part of digitalization and automation in production and service sector where both the developing and developed countries are involved accordingly. To adopt in this situation the developing countries are trying to increase their workforces according to the global demand. They have already taken the computer science as a compulsory subject in 10+2 courses. But the development is very steady because of the shortages of availability of computers and infrastructure for the expected development in this sector. But which is the fundamental factor of development of the students to fill the future requirement of skill workforces in, automation and digitalization sector.
2. Here is a wide scope of aid and investment in developing countries in the Asian region for infrastructure development and computer selling which will help the countries, investor and the receiver, as a foundation for future to fill the requirement of workforces in automation and digitalization sector.
3. The purpose of human resource developments to matching the employee's abilities to the requirements. Growth in income per capita is related with the mixture of goods and services people wish to buy. Artificial Intelligence is shifting the nature of demand of the skilled workforces. But in many developing countries administrative difficulties arises from immorality to understand the shifting of demand and to make policies which will compatible with the new demand created.
4. Here is a wide scope of aid upon training development upon AI technique to build the administrators awareness both in government, non government and private sector and skill for the proper understanding of global policy upon AI and to stay relevant with the policy.

5. Immediate investment fund upon research and development upon AI at the university and college level in the developing countries, which will influence the policy makers to stay on the right track and to stay relevant with the global demand. Universities and colleges could also develop their students upon AI related program and its possible application in different fields. So that the developing countries could contribute themselves by supplying the high skill workforces in home and abroad according to the demand in manufacturing and service sector.
6. Developing countries are suffering from the absence of ability to support its population in health services but the natures of diseases are the same in the both developing and developed countries. Now AI is contributing in the diagnosis of diseases in health sector by very minimum cost, which the developed countries can contribute to the developing countries to build up a healthy world.
7. There are wide scopes of aid and investment in the government health sector of the developing countries in infrastructure development and AI related facility development.
8. Like many other developing countries, the skilled workforces of Bangladesh is contributing computer database and programming related outsourcing jobs and contributing in per capita income. The countries are involved much in AI related manufacturing and business services and already in the competitive position and suffering from higher wages and incremental living expenses, they could get advantage by establishing their final production unit in Bangladesh to get the advantages upon AI. Because Bangladesh is a country where it is not time consuming to increase the workforces upon AI related program and its application and the country is a right place for covering most of the TPP and OBOR market by its location.
9. In many developing countries, technical education decentralization and privatization is a revolutionary step for greater impact as an input in automation and digitalization. But the infrastructure and computer facilities are not provided accordingly. So, to enhance the system and to stay relevant here is a wide scope of investment to make skilled workforce for automation and digitalization.
10. Initiatives to ensure common regulatory approach for data sharing and data protection for common prosperity in the region and globally. This will fuel business development, improve customer service and help to increase operational efficiencies.

11. Initiatives to building national and regional awareness about the threat and opportunities in AI related fields.

Initiatives to building national and regional cooperation for building AI related high tech industrial and service sector for high skill job creation in private sector.

12. Initiatives to building national and regional cooperation for joint venture entrepreneurship upon AI related goods and services and their marketing. Emergence of the UN initiatives to control the development of the AI and Quantum computing, to ensure the legal issues and ethical values of these technologies and its commercialization and militarization.

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## Banks' Exposure to Stock Market: Boon or Bane?

MD. TOUFIQUE HOSSAIN\*

**Abstract:** *Banks' overexposure to the stock market and the latter's overdependence on the former are both unwarranted. Following the banking sector's overexposure to the capital market, the central bank finally set the exposure limit at 25 percent of its capital as suggested by the International Monetary Fund in line with the global practice. The limit was earlier 10 percent while the Ministry of Finance revised it upward to 40 percent. The aim of this paper is to intended to analyze on which of the rates is better. It has been discussed here taking into account the Indian, Pakistani and other global experiences.*

**Key Words:** *Banks' Exposure, Stock Market, Capital Market, Central Bank, IMF*

### 1. Preamble

Bank is a type of financial intermediaries which plays a crucial role by channeling funds from surplus units like households to deficit units such as corporations. Bank-based financial system like the one prevailing in Bangladesh puts much emphasize on banking system for mediating financial resources. However, unlike other industries banking is a very sensitive business in the sense that the funds disburse by banks as loans are actually depositors' money. As such, the regulatory body notably the central bank plays a guardian-like role ensuring depositors that banks are not assuming excessive risks.

One of such regulations imposed on depository financial institutions is the limit on their exposure to the stock market because stocks are considered one of the

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\* Assistant Coordinator Research, Monitoring & Evaluation Division, WAVE Foundation, Dhaka  
E-mail: toufique2010@gmail.com

most risky financial instruments which banks can invest their funds with. Earlier commercial banks in Bangladesh are allowed to invest 10% of their total liabilities (major portion of which is deposit) in the stock market. Very recently our finance minister has announced that the investment limit will be fixed at 40% of their paid-up capital aiming to address the liquidity crisis persists in the prime bourse, the Dhaka Stock Exchange. However, the limit will gradually cut down to 25% over the next three years. The proposed strategy to revive the capital market has stirred the decade-old debate: to what extent banks should be allowed to involve in the stock market?

Banks' investment in the stock market is allowed even in developed countries (to a limited extent) probably because of income diversification and keeping the stock market buoyant. Likewise, banks in Bangladesh are also allowed to do so. Noninterest income of banks in the recent years has been growing significantly which shows a shift in sources from charges on loans to fees and investment income. This helps banks to reduce concentration of their income on loan sales and thereby lessen default risk. Schedule banks' statistics shows that net interest income to total assets increased from 2.17% in 2009 to 2.50% in 2010, which further declined to 2.47% in 2011. On the other hand, non-interest income to total assets increased from 3.01% in 2009 to 3.04% in 2010. The ratio further declined to 2.87% in 2011.

This shows that more than half of the income for bank is coming from non-interest income majority of which is investment income from the capital market. For instance, a random sample of 20 private commercial banks (except Islamic banks) shows that their investment income grew continuously over the last 6 years ending 2010. Total investment income amounted to Tk.471 million in 2006 which rose to Tk.1, 445 million in 2009 and Tk.2, 209 million in 2010. This shows that marvelous growth of banks' non-interest income is mainly due to capital gain from the stock market.

Of course, following the historic stock market crash in December 2010, this route of income has shrunk significantly. This implies that more than half of banks' income is vulnerable to stock price fluctuations. Banks' involvement in the stock market to such an extent cannot be construed as sensible investment decision and healthy banking practice.

Because of the nature of industry, equity participation of banks as source of fund is miniscule. About 77% (in 2009) of schedule banks' total liabilities are provided by depositors. Thus, any adverse effects on banks resulting from the stock market fluctuations would severely hit the depositors. In such a situation a trickle-down

effect of one bank's bankruptcy would definitely hit others which might end up with a bank-run. If so, an emerging and financially shallow economy like Bangladesh can hardly afford to bear the burden. In this sense, regulatory authority should be very cautious in allowing banks for investment in the capital market.

Moreover, banks' strong presence to the stock market might be deleterious in the sense that the ability of individual investors to invest in the stock market is scant compared to the ability of a bank. As such, if the purpose of capital market regulators is to ensure stability in the market, they must encourage individuals' investors who are likely to invest for relatively longer period. Since supply of securities in our market is very limited which results relatively low market capitalization, bank's increased presence would definitely have a crowding out effect on small but individual investors.

We should bear in mind that unless a capital market is blessed by diversified base of individual investors, market dynamism cannot be achieved which is one of core principles of capital market. If the current depressed stock market requires institutional support for the greater interest of the economy, institutions like Investment Corporation of Bangladesh (ICB) and mutual funds can be utilized. Definitely the choice should not be banks.

## **2. Literature Review**

This is a completely new study in the context of Bangladesh, so there is very little analytical research in this regard. This study has been highly reliant on the news published in the country's daily newspapers.

As far as the global practice is concerned, the money market and the capital market are two different entities. Then what is the effect of bank-based finance on the capital market? Let's delve deep into the question as follows.

Basically, the money market is a place where banks deal with short-term loans in the form of commercial bills and treasury bills while the capital market is a place where brokers deal with long-term debts and equity capital in the form of debenture, shares and public deposits. When an individual invests his own money in the stock market, he may not authorize a bank to invest his deposit in the share market.

The share price debacle in 2010-2011, the banks' overexposure drew flak from various quarters. Different sources said that 10 to 12 banks violated the Bank Company Act and invested beyond the limit of 10 percent in the capital market.

At the same time few banks focused more on stock business rather than mainstream banking. Maybe, questions were raised by some quarters from the ethical perspective, but the banks were not directly put in the dock. Now the question is why the Bangladesh Bank (BB) ignored this.

Levine (2002) in his paper “Bank-Based or Market-Based Financial Systems: Which is better?” He pointed out that the fact that classifying countries as bank-based or market is not a very fruitful way to distinguish financial systems. Moreover, he showed the first broad, cross-country examination of which view of financial structure is more consistent with the data. The results of this paper indicated that although overall financial development is robustly linked with economic growth, there is no support for either the bank-based or market-based view.

Beck and Levine (2002) in an article entitled “INDUSTRY GROWTH AND CAPITAL ALLOCATION: DOES HAVING A MARKET- OR BANK-BASED SYSTEM MATTER?”

Authors have tried to point out that “the legal system efficiency and overall financial development boost industry growth, new establishment formation, and efficient capital allocation, having a bank-based or market-based system per se does not seem to matter much.”

Antoniou et al. (2008) discussed their article namely “The determinants of capital structure: capital market-oriented versus bank-oriented institutions.” Their paper investigates how firms operating in capital market-oriented economies (the United Kingdom and the United States) and bank-oriented economies (France, Germany and Japan) determine their capital structure. Authors used panel data to sort out the key ratio namely leverage ratio like how this ratio is positively affected by the tangibility of assets and the size of the firm, but declines with an increase in firm profitability, growth opportunities and share price performance in both types of economies.

Allen and Carletti (2008) conducted the study regarding mark-to-market accounting issue. They revealed that market prices do reflect future earning power and those where market imperfections imply that they do not. Their findings suggested that in financial crisis situations where liquidity is scarce and prices are low as a result, market prices should be supplemented with both model-based and historic cost valuations. The rest of the time and in particular when asset prices are low because expectations of future cash flows have fallen, mark-to-market accounting should instead be used.

Ahsan (2012) expressed that regulators responsible for the setting in appropriate exposure limit.

According to the Daily Star report (2016) "Capital market exposure needs to be calculated on the basis of only listed securities in stock exchanges. In addition, the Dhaka Stock Exchange (DSE) also recommended calculating the banks' total exposure to the stock market without taking into account their investment in non-tradable and non-listed securities such as investment in preference share or bond and subsidiaries."

Further Daily Star report (2016) showed that "Banks to make fresh investments in stocks, although the stock market exposure ceiling remains unchanged at 25 percent of their capital. In December 2015, the banks' capital given to their stock market subsidiaries were kept out of their stock market exposure. The decision came into effect in January 2016. But the move had failed to boost the capital market, which has been witnessing a steep fall in recent days. Moreover, The Banking Companies Act 1991, which was amended in 2013, has limited a bank's stock market exposure to 25 percent of its capital by July 21 2016."

According to Financial Express report (2017) "In 2014, the central bank asked the banks to limit their total investment in capital market on consolidated basis along with the existing solo one to minimise risk in investment portfolios. Under the exiting provisions, the market value of total investment of a banking company in the capital market on consolidated basis will not exceed 50 per cent of the sum of its consolidated paid-up capital, balance in share-premium account, statutory reserves and retained earnings as stated in the latest audited financial statements. On the other hand, the banks are now allowed to invest maximum 25 per cent in the capital market of their total capital on solo basis in line with the Banking Companies (Amended) Act 2013."

### **3. Objectives of the study**

The main objective of this paper is to analyze the reasons as to why banks and capital market should maintain a distance in a financial system. The others crucial objectives are the following:

1. To analyze the effect of bank-based finance on the capital market;
2. To overview the risks of bank-capital market interrelation;
3. To analyze the underlying reasons behind the bank's over exposures issues;
4. To determine which exposure limit is good for the market, in keeping with the global standard;
5. To draw a forward-looking plan how to keep two markets in safe distance.

#### 4. Methodology

Basically, it is an investigative study, which has highlighted the recent events namely bank's exposure in capital market of Bangladesh's. This study has been prepared in conjunction with various secondary relevant documents.

#### 5. The excessive reliance on banking sector

The following tables 1 present data on the banking sector that was dominating the stock market during 2009-10 as well as some more years.

*Table 1: Overall market Vs Banks performance<sup>1</sup>*

Key Indicators	2009	2010	2011	2012	2013	2014	2015	2016
Dividend	23.32	35.58	37.35	30.57	36.47	34.96	35.5	27.78
P/E	25.65	29.16	13.68	12.07	15.07	17.77	15.23	14.29
Overall market EPS	40.21	40.5	49.5	41.05	31.58	30.59	31.38	34.68
Key Indicators								
Dividend	26.16	29.16	31.13	24.88	14.42	15.13	16.08	1.29
P/E	16.46	25.24	10.5	8.68	10.01	8.63	7.4	8.14
Banks EPS	36.37	37.78	43.69	32.11	22.17	22.82	24.85	25.37

In the table 1 find that in 2010 the overall market dividend was 35.58 percent, the overall P/E ratio was 29.16 and the earnings per share (EPS) were 49.50 with the banking sector alone accounting for 29.16, 25.24 and 37.78 respectively. In 2011 the same trend was observed. This proves how the banking sector alone dominated the capital market.

#### 6. The causes of overexposure and the reasons behind the crisis

Basically, the money market is a place where banks deal with short-term loans in the form of commercial bills and treasury bills while the capital market is a place where brokers deal with long-term debts and equity capital in the form of debenture, shares and public deposits. When an individual invests his own money in the stock market, he may not authorize a bank to invest his deposit in the share market. So the banks and the capital market should maintain a safe distance.

During 2009, the country's stock market showed a bullish trend and many banks invested in the stock market beyond their limits. But after the share price debacle in 2010-2011, the banks' overexposure drew flak from various quarters. Different

<sup>1</sup>. Author calculative based on different DSE Monthly Review.

sources said that 10 to 12 banks violated the Bank Company Act and invested beyond the limit of 10 per cent in the capital market. At the same time few banks focused more on stock business rather than mainstream banking. Two main factors worked behind the latest share market debacle: a) The banks saw their overexposure to the stock market, and (b) the market was excessively dependent on the banking sector. If the capital market and the banking sector maintained a safe distance, the two problems could be averted.

A large number of banks made big profits from the share market by investing beyond their ceiling stipulated in the Bank Company Act 1991. The Act limited a bank's investment in the capital market to 10 per cent of its total liabilities which comprise total deposits and borrowings. However, the banks' overexposure came under criticism. What is the rationale of investing investors' money in a risky venture like the capital market? Investing the depositors' money in the capital market without their consent is unfair. It seems to be more appropriate to invest in a productive sector. Banks' excessive investment in the capital market does not always solidify the capital market.

The major cause of any of the market crashes that happened so far across the world was a lot of commercial banks participated in investment or merchant banking activities. Normally the investment of a commercial bank in the share market is limited. The Bank Companies (Amendment) Act, 2013 fixed the limit at 25 per cent of their total regulatory capital. The IMF earlier said the exposure of banks to the capital market should be 25 per cent. The Asian Development Bank (ADB) also suggested that the banks' investment in the capital market should be 25 per cent of their equities instead of liabilities. Then in the draft of the amendment to the act the ministry of finance (MoF) proposed the exposure limit at 40 per cent instead of the 25 per cent, in place of the earlier limit of 10 per cent of liabilities. If the earlier limit of 10 per cent of liabilities is compared with the 40 per cent of the regulatory capital, then obviously the 10 per cent would be higher than the 40 per cent in value. The IMF, for the sake of safekeeping, proposed the limit at 25 per cent of the capital.

Banks that have still retained maximum exposure to the stock market will have to reduce it to 25 per cent of their capital. The banks get three years to cut the exposure limit to 25 per cent. So three years' time is still in their hand.

Now let's look at table-2(a) and 2(b) that's how banks were aggressively trading in the stock market during 2009-10.<sup>2</sup>

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2. Bangladesh Bank and CPD Publications (2<sup>nd</sup> Reading)

Table 2 (a): *Income of Banks*

SI No	Banks	2010	2009	Growth (%)	SI No	Banks Name	2010	2009	Growth (%)
1	National Bank	361 Crore, 64 lakh, 6thousand, 755 Tk	50 Crore, 39 lakh, 83thousand 449 Tk	718	7	The City Bank	55 Crore, 93 lakh, 44thousand 608 Tk.	27 Crore, 99 lakh, 3thousand 627 Tk.	200
2	AB Bank	326 Crore, 84 lakh, 88thousand 614 Tk.	177 Crore, 44 lakh, 26thousand, 855Tk	184	8	Standard Bank	54 Crore, 43lakh, 79thousand 739Tk	9 Crore, 36lakh, 99thousand 515Tk	581
3	Southeast Bank	219 Crore, 66 lakh, 25thousand 322 Tk.	79 Crore, 50 lakh, 46thousand 381 Tk.	276	9	NCC Bank	40 Crore, 86 lakh, 77thousand 346 Tk.	10 Crore, 75 lakh, 88thousand 489 Tk.	380
4	Pubali Bank	149 Crore, 56 lakh, 9thousand 550 Tk.	15 Crore, 99 lakh, 42thousand 287 Tk.	935	10	Trust Bank	31 Crore, 78 lakh, 41thousand 405 Tk.	9 Crore, 26 lakh, 39thousand 65 Tk.	343
5	Exim Bank	129 Crore, 21 lakh, 4thousand 250 Tk.	19 Crore, 24 lakh, 47thousand 997 Tk.	671	11	IFIC Bank	27 Crore, 85 lakh, 73thousand 31 Tk.	15 Crore, 16 lakh, 39thousand 246 Tk.	184
6	Premier Bank	126 Crore, 4 lakh, 30thousand 253 Tk.	4 Crore, 76 lakh, 99thousand 436 Tk.	2642	12	Dhaka Bank	27 Crore, 40 lakh, 29thousand 997 Tk.	1 Crore, 28 lakh, 43thousand 751 Tk.	2165

Table 2 (b): *Income of Banks*

SI No	Banks Name	2010	2009	Growth (%)	SI No	Banks Name	2010	2009	Growth (%)
13	Eastern Bank	122Crore, 56 lakh, 43thousand d, 74 Tk.	2 Crore, 61 lakh, 52thousand, 226 Tk.	4687	17	Dutch-Bangla Bank	19 Crore, 91 lakh, 994thousand d, Tk.	11 Crore, 25 lakh, 82thousand d 261 Tk.	177
14	BRAC Bank	86 Crore, 14 lakh, 72thousand d 265 Tk.	361 Crore, 192 lakh, 94thousand, 263Tk.	4465	18	Bank-Asia	11 Crore, 74 lakh, 70thousand, 745Tk.	8 Crore, 74 lakh, 76thousand 255 Tk.	135
15	One Bank	119 Crore, 29 lakh, 50thousand 577 Tk.	45 Crore, 80 lakh, 1thousand 281 Tk.	260	19	Mutual Trust Bank	10 Crore, 5 lakh, 81thousand 831 Tk.	3 Crore, 24 lakh, 60thousand 821 Tk.	310
16	United Commercial Bank	88 Crore, 4 lakh, 30thousand 266 Tk.	21 Crore, 89 lakh, 19thousand 242 Tk.	402	20	Jamuna Bank	4 Crore, 31 lakh, 33thousand 104 Tk.	-	-
					21	First Security Bank	22 Crore, 4 lakh, 9thousand 973 Tk.	1 Crore, 28 lakh, 43thousand 751 Tk.	1153

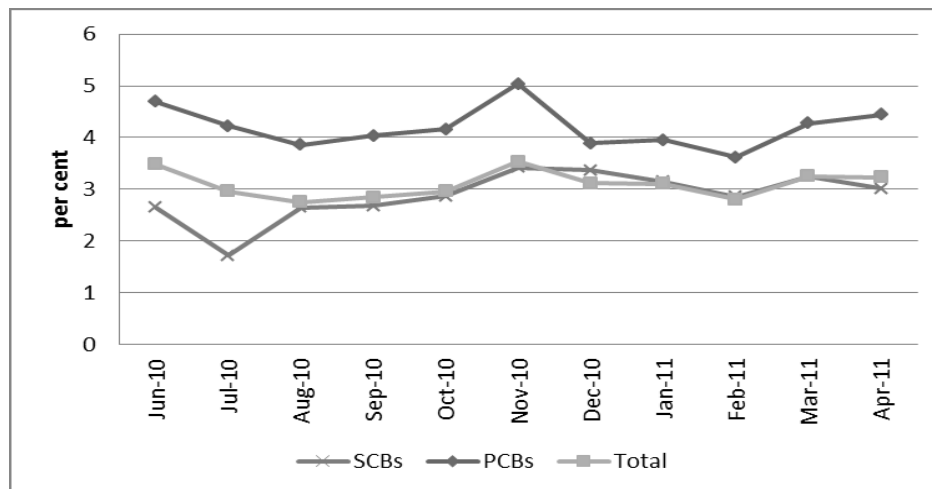


Analysis: In both the table-2(a) and the table 2(b) we see that profits of twenty-one listed commercial banks in the share market. The banks made profits aggressively. The banks invested in share market above the limit and withdrew the money capitalizing on indifference of the Bangladesh Bank. Even after the Bangladesh Bank's instruction those banks did not give any dividend on the profit they made from the share market. So it is urgent to establish the merchant banks as separate subsidiaries. If it was done earlier, the aggressive profit-taking might not happen.

### 7. Overall scenario of banks' investments in 2010<sup>3</sup>

The private commercial banks exhibited a momentous ascending movement of the curve on their investments in the share market, as we see in the graph1 below, during 2010 just before the stock market's fall. However, exposure of banks to the capital market was coming down after the debacle of the stock market before swelling in the recent months.

Graph1: Commercial Banks exposure of Capital Market



### 8. International norms

Stock market investments should be from the market's own capital. Banks cannot invest depositors' money in the share market, because, customers do not authorize banks to invest their deposits in the stock market. If necessary, the customers themselves can invest the money in the stocks. For that reason, the Indian and

3. Author calculation based on different annual Reports.

Pakistani bank company acts stipulate that the banks' exposure to stocks will be based on banks' equity or owners' capital, not deposit or liability. But in Bangladesh the earlier Bank Company Act provided for investment of banks' 10 percent of liabilities in the stock market.

A similar thing happened in the USA during the stock market/ Wall Street crash in 1929. The Wall Street (US stock market) entered a bubble territory, when investment/ merchant banks were ponderously lending from commercial banks to meet the rising customer demand for funds. During the period of Wall Street crash, we observed many banks purchased poor fundamental-based stocks for resale to the public. Clients were highly motivated to invest such types of stocks. During the Wall Street Crash the average P/E ratio of S&P Composite index stood at 32 in September in 1929. Then the bubble burst happened in October, the investors lost large amounts of money due to heavy margin buying.

After the Wall Street crash in 1929 the US policy makers adopted a special law to draw an absolutely separate line between commercial banks and investment banks. The U.S. Congress passed in 1933 the special Banking Act, which is known as the Glass-Steagall Act. The main goal of this special Act was to prevent "infelicitous banking activities" in the capital market. Here infelicitous banking activities mean demonstrative participation of commercial banks in the stock market investment, which was presumed the major reason of the financial crash. Commercial banks took too many risks with the depositors' money. So it is clear that the Glass-Steagall Act was not favorable for the financial market and it was abolished in 1999. It was gradually watered-down by the Congress and finally repealed in 1999.

Later USA former President Barack Obama took some good steps. He introduced the "Volcker PLAN" on June 21, 2010 with the help of his economic advisor Paul Volcker. The main objective of this law is to regulate the U.S. banking system in the event of speculative investments.

### **9. What is appropriate, 25% or 40%?**

Obviously there are a few investments of commercial banks in the capital market. But that should not cross the limit. It is better for commercial banks to invest 5 to 10 per cent of capital in the stock market. If compared with 25 per cent exposure of banks to the stock market as practiced internationally, both 10 per cent of liabilities and 40 per cent of capital are far higher than that. Here are some numerical or logical analyses of two prospective banks' investments in the share market in 2010:

Table 3: Logical Analysis of Bank's Exposure<sup>4</sup>

Analysis 1: Effect of 10% liability of AB Bank Limited	Analysis 2: Effect of 10% liability of Jamuna Bank Limited	Analysis 3: The effect of 40% and 25% of total Capital in AB Bank Limited	Analysis 4: The effect of 40% and 25% of total Capital in Jamuna Bank Limited
Total Liabilities of AB Bank Ltd As of 2010 is 118,824,696,515	Total Liabilities of Jamuna Bank Ltd As of 2010 is 63,605,708,135	Total Capital/ Shareholder's Equity of AB Bank Ltd As of 2010 is 13,866,508,216	Total Capital/ Shareholder's Equity of Jamuna Bank Ltd As of 2010 is 6,408,191,252
As per as Existing Rules to find out 10% of total liabilities	As per as Existing Rules to find out 10% of total liabilities	According to MOF proposal to find out 40% of total Equity/ Capital	According to MOF proposal to find out 40% of total Equity/ Capital
$= (118,824,696,515 / 10\%)$	$= (63,605,708,135 / 10\%)$	$= (13,866,508,216 / 10\%)$	$= (6,408,191,252 / 10\%)$
= 118,824.6965 Tk. In million	= 63,605.70813 Tk. In million	= 13,866.50821 Tk. In million	= 6,408.191252 Tk. In million
$= (118,824.6965 * 10)$	$= (63,605.70813 * 10\%)$	$= (13,866.50821 * 40\%)$	$= (6,408.191252 * 40\%)$
= 11,882.47 Tk. in million.	= 6,360.57 Tk. In million	= 5,546.60 TK. in million.	= 2,563.28 TK. in million.
		As per as new Bank Company ACT, 2013 fix up the bank exposure 25% of its Regulatory Capital	As per as new Bank Company ACT, 2013 fix up the bank exposure 25% of its Regulatory Capital
		$= (13,866.50821 * 25\%) = 3,466.63$ TK. in million.	$= (6,408.191252 * 25\%) = 1,602.05$ TK. in million.

Now let us sum up here what the logical analysis of Bank Exposure above on the two banks' to the stock markets denote.

In a balance sheet of a bank the total liability consists of borrowing from other banks, financial institutions, agents and various deposit accounts. On the other hand, Owners' Capital/ Shareholders' Equity consists of paid-up capital, statutory reserve, General Reserve, Other Reserve and Retained earnings. So the above analyses reveal that (a) The banks' 40% of total capital are smaller than 10% of the liabilities; (b) The banks' 25% of total Capital also is smaller than both the 40% of total capital and 10% of the liabilities.

## 10. Policy measures and Recommendations

According to the amended Bank Company Act, banks' exposure to the capital market has been lowered to 25 per cent of their total regulatory capital. Besides, if any bank buys shares of other companies, it will not be more than 5 per cent of

4. Author calculation based on different annual Reports.

the bank's capital. Basically the new bank companies' act stipulates the banks' stock exposure. At the time of calculation of banks' total investment in stocks, the banks will have to take into consideration the components including all kinds of shares, debenture, corporate bonds, mutual fund units and other securities. Moreover, banks will have to follow all prerequisite banking rules and regulations in lending credit to their subsidiary companies like brokerage firms, merchant banks and other allied institutions.

Four agendas are notable here:

- (i) The existing exposure ceiling of banks is calculated only based on the paid-up capital under the Tier -1. But the IMF suggests that the 25 per cent exposure limit should be calculated also on the reserve, retained earnings and share premium as practiced globally under the Tier-II and the Tier-III of the BASEL compulsion;
- (ii) Of course, the commercial bank's investment should be limited in the capital stock market, whether the stock market is bullish or not;
- (iii) Investment in a share market is always risky. So it is better to invest 25-30 per cent of capital in the capital market and
- (iv) Exposure should be excluded with non-tradable and non-listed securities like preference share, bond etc.

### **10.1 Recommendation of IMF**

Normally the investment of a commercial bank in the share market is limited. The bank cannot cross the limit, which has been fixed now at 25 per cent in the Bank Companies (Amendment) Act, 2013. The International Monetary fund (IMF) earlier said the exposure of banks to the capital market should be 25 per cent. The IMF and the Asian Development Bank (ADB) suggested that the banks' investment in the capital market should be 25 per cent of their equities instead of liabilities. The donor agencies suggested it before disbursement of US\$ 150 million, the second installment of a \$300 million loan under a capital market development programme. Then in the draft of the amendment to the act the ministry of finance (MoF) proposed the exposure limit at 40 per cent instead of the 25 per cent suggested by the IMF in place of the earlier limit of 10 per cent of their respective liabilities. If the earlier limit of 10 per cent of liabilities is compared with the 40 per cent of the regulatory capital, then obviously the 10 per cent will be higher than the 40 per cent in value. The IMF, for the sake of safekeeping, has proposed the limit at 25 per cent of the capital.

## **11. Conclusion**

The overexposure of banks to the stock market and too much dependence of the market on the banking sector led to the debacle in 2010-11 after the skyrocketing share prices in 2009-10 that happened without any valid reason. The million-dollar question now is: should banks invest more in a volatile share market to accelerate growth of the market? Pumping money into the stock market from the banking sector would not ensure development of the market.

After the debacle in 2010-11 a good number of banks faced a severe liquidity shortage. Actually when a decision was made about the banks' investment limit of 10 percent, already many banks invested 30 to 35 percent of their liabilities in the share market. It could be better if the Bangladesh Bank (BB) monitored the situation since the very beginning. In addition, when the Bangladesh Bank instructed those commercial banks to overcome the situation by January, 2011, they readjusted the limit by selling shares. The ultimate result was all the banks started selling their holdings leaving the market under pressure.

The new limit on banks' exposure to the stock market might prove helpful, provided the central bank keeps a close and constant watch on the flow of funds into the market from the banking sector.

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## The Effectiveness of Monetary Policy in Bangladesh: A VAR Approach

RUBAYAT CHOWDHURY\*

**Abstract:** *This study examined the monetary policy effectiveness in Bangladesh with a vector autoregression (VAR) approach. Recursive identification was used to evaluate the dynamic response of macroeconomic variables to a positive nominal interest rate shock. The results show that over the period 2000-2013, the monetary policy was effective in influencing aggregate output, price level, exchange rate and stock prices. This paper also finds that money supply does not perform well as a monetary policy instrument to influence the real variables. Results from the Bangladesh model imply that output and prices are more sensitive to changes in the short term interest rates.*

**JEL Classifications:** E40, E52, E58

**Keywords:** *Vector Autoregression, monetary policy, Bangladesh.*

### 1. Introduction

The financial sector of Bangladesh has experienced major reforms over the past two decades. The deposit and lending interest rates were gradually liberalized in the 1990s and floating exchange rate regime was adopted in 2003 (Bangladesh Bank 2009). Since then, monetary policy has gained importance in macroeconomic policy with greater autonomy of the monetary authority (Ahmed & Islam 2004). The monetary policy of Bangladesh aims at promoting faster and sustained economic growth, maintaining price stability, and ensuring external sector viability (Bangladesh Bank 2009). Critics often argue that a broader set of objectives has prevented Bangladesh's monetary policy from achieving its major goal of price stability (Hossain 2010).

\* Joint Director, Research Department, Bangladesh Bank.  
E-mail: rubayat.chowdhury@bb.org.bd

The effectiveness of monetary policy depends on the macroeconomic and financial structure of an economy (Cottarelli & Kourelis 1994). However, there is broad agreement that a contractionary monetary policy (an increase in the short term interest rate) leads to a lower level of output and price, however only by a modest amount (Christiano et al. 1999). A higher interest rate increases the cost of capital which leads to a lower level of investment and aggregate demand and hence to a lower level of output and price. Friedman and Schwartz (2008) argue that an exogenous positive shock to the money supply is expected to increase output and price, and reduce interest rate in the short run. Fujiwara (2004) argues that a contractionary monetary policy is expected to appreciate the exchange rate in the short run. A higher interest rate causes foreign capital to flow into the domestic economy, leading to an excess supply of the foreign currency and hence to an appreciation of the exchange rate.

This paper uses the vector autoregression (VAR) approach (Sims 1980) and follows a recursive identification (Christiano, Eichenbaum & Evans 1996) to evaluate the effectiveness of monetary policy in Bangladesh. Using quarterly data for the period 2000-2013, this study investigates the dynamic response of the macroeconomic variables to a positive shock in the nominal interest rate, with the following Choleski ordering: output, price, interest rate, exchange rate and stock price. The monetary rule in Bangladesh is defined as the broad money (M2) targeting rule where reserve money is used as the operating target to influence the broad money growth path. The central bank announces its key policy interest rates (repo and reverse repo rates) to influence the growth of broad money. As the data on policy interest rates are not available for Bangladesh, this paper uses the nominal interest rate (average of the deposit and lending interest rates) as a proxy for the policy interest rate on the assumption that any changes in the policy interest rates would be reflected in the short term interest rates.

The VAR models are able to produce rich dynamic behavior of the macroeconomic variables by treating all variables as endogenous. However, the VAR approach has not been widely utilized to evaluate the monetary policy effectiveness in Bangladesh. Rahman (2005) employs an unrestricted VAR and uses annual data for the period 1975-2003 to evaluate the relative effectiveness of fiscal and monetary policy in Bangladesh. He finds that an increase in real money supply leads to higher output growth. Applying a vector error correction model and using annual data for the period 1974-2000, Maroney et al. (2004) find that monetary policy is more effective than fiscal policy in influencing output, price and net exports in Bangladesh. Using quarterly data for the period 1979-2003, Ahmed and Islam (2004) analyze the monetary transmission mechanism in



Bangladesh with an unrestricted VAR. They find that both bank lending and exchange rate channels are weak in influencing real output in Bangladesh.

However, these studies are mostly based on annual data and do not examine the effectiveness of monetary policy in Bangladesh under the post-floating exchange rate regime. This paper adds to the literature by covering more recent data for Bangladesh which includes the floating exchange rate regime. Further, unlike past studies this paper uses nominal interest rate as the monetary policy shock. The impulse response and variance decomposition results suggest that over the period 2000-2013, the monetary policy of Bangladesh has been effective in influencing output and price level. A positive shock to the interest rate leads to lower level of output and price and appreciation of the exchange rate. Further, this paper finds that money supply does not perform well in explaining the dynamics of output and price in Bangladesh, when used as a monetary policy shock.

The remainder of this paper is structured as follows. Section 2 provides a brief overview of the monetary policy framework in Bangladesh. The VAR model and short run restrictions are explained in Section 3. Section 4 summarizes and discusses the results and Section 5 concludes.

## **2. Monetary Policy Framework in Bangladesh**

Bangladesh Bank (BB), the central bank of Bangladesh, formulates and implements monetary policy. The primary objective of BB's monetary policy is to maintain price stability and external sector viability (Bangladesh Bank 2009). Further, the monetary policy stance since 2010 campaign on financial inclusion policies such as directing credit towards the agriculture and small and medium enterprises to promote inclusive and higher economic growth (Bangladesh Bank 2011).

The monetary policy of Bangladesh during the 1970s and 1980s was characterized by direct control over the exchange rate and interest rates (Hossain 2010). Further, during that period, BB had active control over the volume and direction of credit flows. Major reforms took place in the late 1990s and early 2000s followed by the International Monetary Fund (IMF) supported Structural Adjustment Program (SAP) launched in the mid 1980s (Rahman 2005). Lending and deposit interest rates were gradually liberalized in the 1990s and floating exchange rate regime was adopted in May 2003. Key policy interest rates (repo and reverse repo rates) were introduced July 2002 and April 2003 respectively. However, there exist occasional central bank interventions in the credit and foreign exchange markets to stabilize sharp fluctuations around the trend

(Bangladesh Bank 2011). Further, external capital account is controlled with restrictions on capital outflows.

Since 2006, Bangladesh Bank has been announcing its monetary policy stance semi-annually. The monetary rule is defined as the broad money (M2) targeting rule to influence the consumer price index (Bangladesh Bank 2009). BB draws up monetary programs each financial year with a target M2 growth path, consistent with the projected output growth and inflation. Reserve money (RM) growth path is used as the operating target to influence the broad money growth path, which in turn impact the consumer price index. Besides day to day changes in the reserve money, BB announces its key policy interest rates (repo and reverse repo rates) and adjusts cash reserve requirement (CRR) and statutory liquidity requirements (SLR) to influence the broad money growth path.

### 3. Method and Data

#### 3.1 The VAR model

This paper employs a simple recursive vector autoregression approach following Christiano, Eichenbaum and Evans (1996) to examine the dynamic impact of a monetary policy shock on output, price level, exchange rate and the stock price. The VAR was estimated with the ordinary least squares (OLS) method using quarterly data for the period 2000-2013. The statistical software EViews (version 6) was used for estimation and diagnostic checks. The lag length was chosen optimally based on two considerations: information criteria and stability of the VAR. The Akaike Information Criterion suggests a lag order of 4 while the Schwarz Information Criterion and the Hannan-Quinn Criterion suggest a lag order of 1. However, the VAR is not stable at the lag order of 1; only a lag order of 4 satisfies the stability condition that no root lies outside the unit circle.

The reduced form 5-variable VAR with a lag order of 4, ignoring the constant term is expressed as:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + A_3 Y_{t-3} + A_4 Y_{t-4} + U_t \quad (1)$$

Where,  $Y_t$  is the (5×1) vector of endogenous variables,  $Y_{t-i}$  is the (5×1) vector of endogenous variables in lag  $i$ ,  $A_i$  is the (5×5) matrix of coefficients in period  $t-i$  and  $U_t$  is the (5×1) vector of shocks. The VAR has been estimated in a logarithmic functional form where all variables in  $Y$  appear in their natural logs of actual value except for the nominal interest rate which appears in its actual value. The shock vector is specified as:

$$\begin{bmatrix} U_y \\ U_p \\ U_i \\ U_e \\ U_s \end{bmatrix} \sim N \left[ \mathbf{0}, \begin{pmatrix} \sigma_{yy}^2 & \sigma_{yy,up} & \sigma_{yy,ui} & \sigma_{yy,ue} & \sigma_{yy,us} \\ \sigma_{up,uy} & \sigma_{up}^2 & \sigma_{up,ui} & \sigma_{up,ue} & \sigma_{up,us} \\ \sigma_{ui,uy} & \sigma_{ui,up} & \sigma_{ui}^2 & \sigma_{ui,ue} & \sigma_{ui,us} \\ \sigma_{ue,uy} & \sigma_{ue,up} & \sigma_{ue,ui} & \sigma_{ue}^2 & \sigma_{ue,us} \\ \sigma_{us,uy} & \sigma_{us,up} & \sigma_{us,ui} & \sigma_{us,ue} & \sigma_{us}^2 \end{pmatrix} \right] \quad (2)$$

Where,

- y : log of industrial production index (proxy for output, 2010=100)
- p : log of consumer price index (2010=100)
- i : nominal interest rate (percent)
- e : log of exchange rate (local currency per unit of US dollar)
- s : log of stock price index (2010=100)

The nominal interest rate (average of the deposit and lending interest rates), *i* has been used as a proxy for the central bank’s policy interest rates. We are interested to examine how an intrinsic shock to the monetary policy variable affects other variables in the VAR system dynamically. However, shocks in  $U_t$  are usually contemporaneously correlated so that  $u_i$  may not be an intrinsic or orthogonal shock to the policy interest rate. In this case, it is not plausible to interpret that a shock to the other variables in the system is solely due to the monetary policy shock.

The diagonal elements in the variance-covariance matrix (2) denote constant variance and the off-diagonal elements denote non-zero covariance among the shocks. We need the shocks to be orthogonal to estimate the impulse response functions and variance decompositions. Therefore, we impose the short run restrictions where correlated shocks,  $U_t$  are expressed in terms of the structural shocks,  $E_t$  as:

$$\begin{bmatrix} U_y \\ U_p \\ U_i \\ U_e \\ U_s \end{bmatrix} = \begin{bmatrix} t_{11} & 0 & 0 & 0 & 0 \\ t_{21} & t_{22} & 0 & 0 & 0 \\ t_{31} & t_{32} & t_{33} & 0 & 0 \\ t_{41} & t_{42} & t_{43} & t_{44} & 0 \\ t_{51} & t_{52} & t_{53} & t_{54} & t_{55} \end{bmatrix} \begin{bmatrix} \varepsilon_y \\ \varepsilon_p \\ \varepsilon_i \\ \varepsilon_e \\ \varepsilon_s \end{bmatrix} \quad (3)$$

$U_t$                                    $T_t$                                    $E_t$

Where,

$$\begin{bmatrix} \varepsilon_y \\ \varepsilon_p \\ \varepsilon_i \\ \varepsilon_e \\ \varepsilon_s \end{bmatrix} \sim N \left[ \mathbf{0}, \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \right]$$

Thus, the correlated shocks in  $U_t$  are expressed in terms of the orthogonal shocks in  $E_t$  which are normally distributed with unit variance and zero covariance.  $E_t$  is now an orthogonal shock to the interest rate. The lower triangular matrix,  $T_t$  can be obtained by applying Choleski decomposition to the variance-covariance matrix,  $U_t U_t'$  as:

$$U_t U_t' = (T_t E_t)(T_t E_t)' = T_t (E_t E_t') T_t' = T_t I T_t' = T_t T_t'$$

Where,  $I$  is the  $(5 \times 5)$  identity matrix. Thus, we can write (1) as:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + A_3 Y_{t-3} + A_4 Y_{t-4} + T_t E_t \quad (4)$$

Since the inverse of a lower triangular matrix is a lower triangular matrix, we can pre-multiply (4) by  $T_t^{-1}$  to obtain the structural VAR as:

$$Y_t = (I - T_t^{-1}) Y_t + T_t^{-1} A_1 Y_{t-1} + T_t^{-1} A_2 Y_{t-2} + T_t^{-1} A_3 Y_{t-3} + T_t^{-1} A_4 Y_{t-4} + E_t \quad (5)$$

Thus, the reduced form VAR (Model 1) has been transformed into a structural VAR (Model 5) where shocks are orthogonal to each other. We can now estimate (5) by the OLS.

While ordering is not important for the estimation of VAR, impulse responses derived from VAR depend crucially on how the variables are ordered in the Choleski decomposition. Usually, the most endogenous variable is placed last and the least endogenous variable is placed first so that the variables in the higher order are assumed not to be contemporaneously affected by the variables in the lower order.

The monetary authority usually looks at the current state of the economy when setting its operating instrument. Christiano et al. (1996) argue that among other variables, the central bank looks at the current output and prices when setting its policy instrument so that output and prices do not respond contemporaneously to the monetary policy shock. Conversely, some others (Leeper et al. 1996; Sims & Zha 2006) argue that this assumption is controversial as the current data on output and price is not available to the monetary authority when it decides monetary policy. They rather assume that current output and prices do not enter into the central bank's policy function. While both assumptions are debatable (Christiano et al. 1999), it is reasonable to assume that the monetary authority has some information on output and prices while deciding its policy.

This paper follows the recursive identification by Christiano, Eichenbaum and Evans (1996) that output and price respond to the monetary policy shock only with a lag. The central bank of Bangladesh looks at the current output (industrial production index) and price level, and then sets its policy interest rates which

impact the exchange rate and stock prices contemporaneously. Therefore, the impulse responses were derived with the following Choleski ordering: output, price, interest rate, exchange rate and stock price.

The short run restrictions are:

- Output does not react contemporaneously to shocks to the other variables in the system.
- The price level does not react contemporaneously to the interest rate, exchange rate and stock price shocks, but is contemporaneously affected by the output shock.
- Interest rate is contemporaneously affected by the output and price shocks, but responds to the exchange rate and stock price shocks only with a lag.
- The exchange rate does not react contemporaneously to the stock price shock but is contemporaneously affected by the output, price and interest rate shocks.
- Finally, the stock price is contemporaneously affected by all the variables in the system but does not have contemporaneous effect on any variables.

### 3.2 Data

The study employed quarterly data for Bangladesh on the industrial production index, consumer price index, nominal interest rate, nominal exchange rate, and the stock price index for the period 2000-2013. All data were collected from the online database (International Financial Statistics) of the International Monetary Fund (IMF). Quarterly data on real GDP is not available for Bangladesh. Therefore, industrial production index was used as a proxy for real GDP. Nominal interest rate was calculated as the average of the deposit and lending interest rates, as a proxy for the policy interest rates.

The IMF collects data from the relevant statistical agencies of Bangladesh. No information was found about the seasonal adjustments of data on the industrial production index and consumer price index. However, when 'seasonal graphs' were plotted for these variables in EViews, seasonal patterns were observed. Therefore, seasonal adjustment was carried out through the 'U.S. Census Bureau's X12 seasonal adjustment program' in EViews. Then, all the variables were converted into their natural log except for the nominal interest rate.

### 3.3 Unit root test

All series were tested for unit root with the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. A time series is stationary (does not contain unit root), if it has constant mean, variance and covariance over time (Heij et al. 2004, p. Consider,

$$Z_t = \delta Z_{t-1} + v_t$$

$H_0: \delta = 1$ ,  $Z_t$  is non-stationary  
 $H_A: \delta \neq 1$ ,  $Z_t$  is stationary

The ADF test is specified as,

$$\Delta Z_t = \alpha + \beta t + \delta Z_{t-1} + \gamma_1 + \sum_{i=1}^m \Delta Z_{t-i} + w_t \quad (6)$$

536). It is important for a time series to satisfy the stationary property; otherwise the series is exploding over time (Dickey & Fuller 1981).

The ADF test checks stationarity of  $Z_t$  by testing the null hypothesis in (6),  $H_0: \delta=0$ , ( $Z_t$  is non-stationary). If the test statistic is smaller than the critical  $\tau$  (tau) statistic, developed by MacKinnon (1996, p. 13) at 5 percent level of significance, we reject the null hypothesis and conclude that  $Z_t$  is stationary. Unlike the ADF test, the Phillips-Perron test employs non-parametric methods to consider possible serial correlation in the error term,  $w_t$  and does not include the lagged difference term,  $\sum_{i=1}^m \Delta Z_{t-i}$  (Phillips & Perron 1988). Both ADF and PP tests were carried out again at first difference if a series was found non-stationary at level at 5 percent level of significance. The unit root results are reported in Table 1.

Table 1: Augmented Dickey-Fuller and Phillips-Perron test results for unit root

Variables	Test statistics				Decision
	ADF At level	ADF At first difference	Phillips-Perron At level	Phillips-Perron At first difference	
Output (y)	-2.64	-10.53***	-2.64	-13.97***	I(1)
Price (p)	-2.78	- 6.18***	-2.84	- 6.13***	I(1)
Interest rate (i)	-3.17	- 5.40***	-2.55	- 5.35***	I(1)
Exchange rate (e)	-1.79	- 5.27***	-1.57	- 5.43***	I(1)
Stock price (s)	-2.13	- 5.44***	-2.05	- 5.52***	I(1)

All variables are in their natural log except for the nominal interest rate.

Schwarz Information Criterion is used for the ADF test.

Tests include trend and intercept, except for the nominal interest rate which includes intercept only.

\*\*\* indicates the series is stationary at 1% level.

I(1) indicates the series is stationary at its first difference.

The unit root test results suggest that while all the variables in their natural log (except for the nominal interest rate) are non-stationary at their levels, they are stationary at their first difference, that is, they are  $I(1)$ .

## 4. Results

### 4.1 Impulse response functions

Figure 1 presents the impulse responses to a positive interest rate shock from the 5-variable VAR (Model 5), with the Choleski ordering specified above. The dynamic path of the endogenous variables is computed with one standard deviation shock to the interest rate. The point estimates of the impulse responses are given by the solid lines and the dotted lines indicate 95 percent confidence interval about the point estimates. LY, LP, LE and LS indicate output, price, exchange rate, and stock price respectively in their natural log, while I indicates the nominal interest rate. The impulse responses are reported for 20 quarters.

Figure 1 shows that a contractionary monetary policy (a positive shock to the interest rate by 42 basis points in the first quarter) leads to a lower level of output and price. Output declines from the third quarter and the aggregate price level falls from the second quarter in response to a positive interest rate shock. Output exhibits the peak decline in quarter 6 (1.8 percent). The confidence interval suggests significant negative response of output between the fourth and tenth quarter to a positive interest rate shock. On the other hand, the price level falls significantly from the seventh quarter and up to the tenth quarter. The exchange rate appreciates and the stock price falls immediately following a positive interest rate shock. A higher interest rate leads to a significant drop in the stock price over the first six quarters.

The results therefore suggest that the model performs well in explaining the dynamics of Bangladesh economy in response to a monetary policy shock. To check the robustness of short term nominal interest rate as a monetary policy shock, the VAR was estimated again (with a lag order of 4) with the interest rate replaced by the broad money (M2) stock. The impulse responses were derived with the following Choleski ordering:  $y, p, m, e, s$  where,  $m$  indicates money supply and all variables appear in their natural logs in the VAR estimation. The impulse responses to a positive money supply shock are presented in Figure 2. We do not observe expected dynamics of output, price and exchange rate in response to a positive money supply shock. In response to an expansionary monetary policy (a positive shock to the money supply), output and price falls and the exchange rate appreciates in the short run. Further, the impulse responses are not significant.

This suggests that aggregate output and price level in Bangladesh are more sensitive to changes in the nominal interest rate compared to the money supply shock.

Figure 1: Impulse responses to a positive interest rate shock

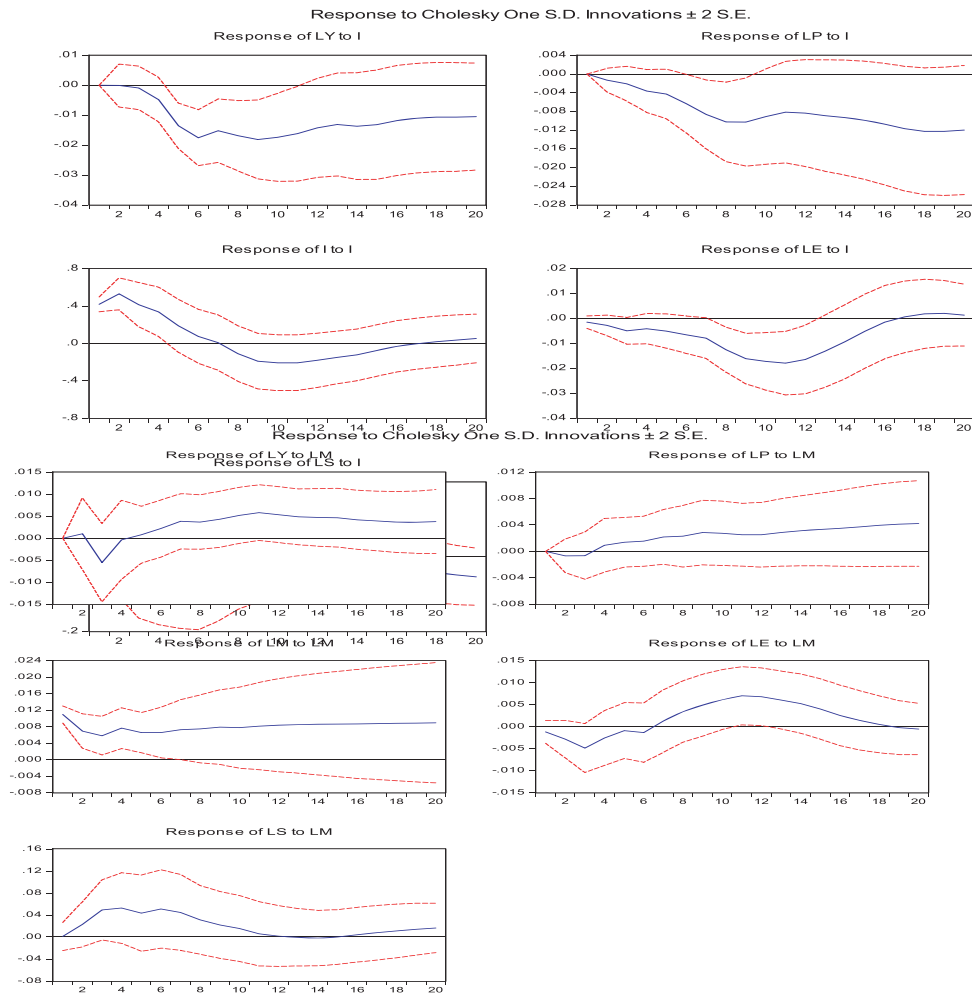


Figure 2: Impulse responses to a positive money supply shock



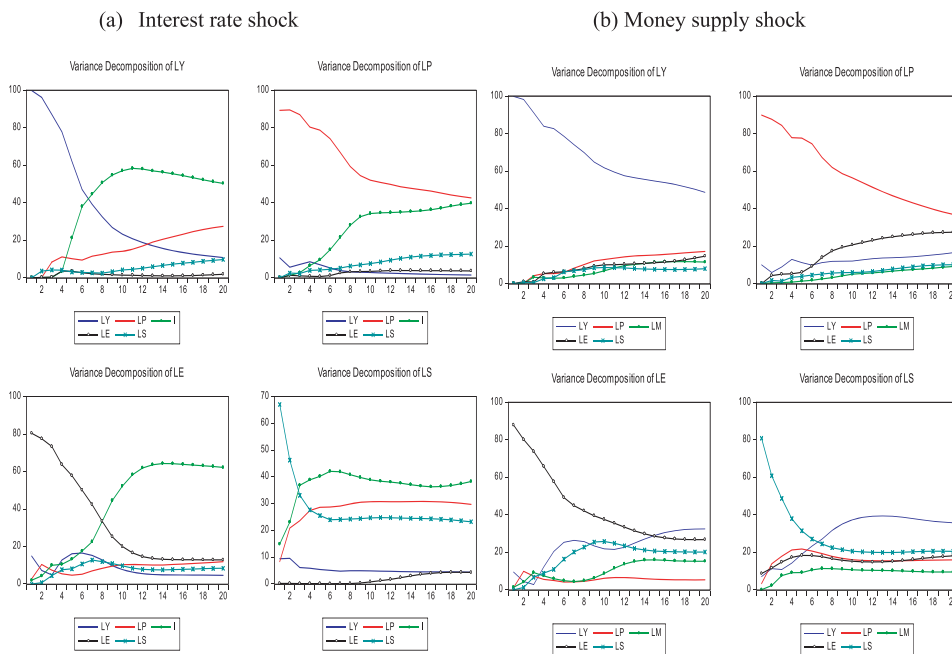
### 4.2 Variance decompositions

The VAR model allows decomposition of the sources of variance of each endogenous variable, which is known as the variance decomposition. The variance decomposition shows the proportion of variations in each variable that can be explained by all shocks in the VAR system. The variance decomposition results are presented in Figure 3.

In the fourth quarter, the interest rate shock explains only 4 and 6 percent of the variations in output and price level respectively (Figure 3a). Around 78 percent of the variations in output are explained by its own shock and 80 percent of the variations in the price level are explained by itself in the fourth quarter. However, by the tenth quarter, the interest rate shock accounts for 57 percent and 34 percent of the variations in output and price respectively, and also explains significant proportion of variations in the exchange rate and stock prices.

Conversely, when money supply is used as a monetary policy shock (Figure 3b), it accounts for less than 10 percent of the variations in output and price level. This suggests that money supply does not perform well as a monetary policy instrument to explain variations in output and price in Bangladesh.

Figure 3: Variance decompositions



### **Conclusion**

It is important for a central bank to evaluate the effectiveness of monetary policy under different policy regimes. This paper examines the effectiveness of monetary policy in Bangladesh over the period 2000-2013, which includes the floating exchange rate regime. A 5-variable VAR has been estimated with a simple recursive identification to evaluate the dynamic response of aggregate output, price level, exchange rate and stock prices to a positive shock in the nominal interest rate. The impulse responses perform well in explaining the dynamics of economic aggregates and support theoretical context and other empirical studies. A higher nominal interest rate reduces output and price, and leads to an appreciation of the exchange rate. Further, the interest rate shock accounts for significant proportion of variations in output and price. This paper also finds that a shock to the money supply does not have significant impact on output and price in Bangladesh.

However, the results would be more reliable if the data on policy interest rates were available. Further, a time varying VAR could be applied to account for structural changes (if any) during the sample period. A 'sign restricted VAR' approach could be employed to explain the unexpected dynamic responses of the economic aggregates in Bangladesh to a money supply shock. Future research on the monetary policy of Bangladesh can explore these issues.

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## Cointegration and Causality between Stock Market Development and Economic Growth in Bangladesh

MD. ABU HASAN\*

MD. SANAULLAH\*\*

ANITA ZAMAN\*\*\*

**Abstract:** *In this study, we employ Johansen cointegration, Vector Error Correction Model (VECM) and Granger causality Wald test based on VECM to investigate the linkage between stock market development and real economic growth in Bangladesh for the period from 1981 to 2014. Cointegration test confirms that there is a long run positive relationship exists between real economic growth and stock market development in Bangladesh. The empirical result based on the VECM estimate indicates that long run causality is running from stock market development to economic growth. The result also implies that real GDP growth in Bangladesh takes only eight and half months to converge to its long run equilibrium. The Granger causality Wald tests suggest that there is bidirectional causality running between real GDP growth and stock market development in the short run. Therefore, real economic growth and stock market development in Bangladesh are seemingly dependent as economic growth leads to stock market development (market capitalization ratio and turnover ratio) and turnover ratio leads to economic growth.*

**Keywords:** *Stock Market Size, Economic Growth, Cointegration, Vector Error Correction Model*

\* Assistant Professor, Economics (BCS, Education).

\*\* Associate Professor, Economics (BCS, Education).

\*\*\* Masters in Economics, University of Rajshahi, Rajshahi, Bangladesh.

E-mail: hhafij@yahoo.com

## 1. Introduction

Financial markets and intermediaries play lots of vigorous functions to the rapid development of an economy. From the time when the pioneering contributors, such as, [1], [2], [3] and [4] reveal the positive relationship between financial development and economic growth, the thought generates an important issue of debate. In their literature, [5] argue that the causal relationships between financial development and economic growth are sketched along three lines: (i) financial deepening promotes economic growth, (ii) economic growth stimulates financial development and (iii) financial development and economic growth influence each other. [3] and [4] contend the link from financial deepening to growth, while [2] supports the opposite direction.

More interestingly, [6] find the bi-directional causality between financial development and economic growth. Though, the initiatives of relating economic growth to the financial development have performed long ago, that mainly emphasized the role of the banking sector in economic growth. In the past few decades, the world stock markets obtained more attention in consequence of the growing importance to allocate the necessary capital required for the consistent growth of the economy. The empirical literatures provides the contrasting results on the impact of stock market development on economic growth. Several studies, such as, [7]-[11] claim that stock market development significantly promotes economic growth of a country both directly and indirectly. Unlike [12], reference [13] dispute that stock market of Bangladesh does not have almost any effect on the real economic activity.

Similar to most developing countries, the financial sector of Bangladesh is dominated by 56 scheduled banks who operate under full control and supervision of Bangladesh Bank. Apart from foreign banks, most of the Bangladeshi scheduled banks are disappointing to attain satisfactory improvement in spite of a series of reform initiatives over the years. The worst scams in the history of the banking sector of Bangladesh took place during the last few years while, about 100 billion Taka wiped out by the fraud customers with the help of bank directors and officials [14]. Moreover, bad debts increased from 6% to 11% in 2013 [15]. So, bank dominating financial system of Bangladesh is nearly seeming close to the catastrophe bring about by massive nonperforming loans. The studies, such as, [16] and [17] may be a strategic way out for the policymakers of Bangladesh as they uncover that capital markets' development supports a stable evolution in the banking sector. Most of the researches related to emerging stock markets suggest that the markets are informationally inefficient and can provide more

return [18-19]. Thus, stock market may perhaps be an appropriate financial system of Bangladesh not only for the new and old industrialists but also for the individuals who want to earn more return.

The researchers and policy makers pay a lot of attention to find out the ways in which economic growth can be enhanced as it is judged as the prime economic objective for any economy. Since stock market is considered as an engine for growth, the researchers and policymakers would pay a special effort to better understand the relationship between stock market development and economic growth. The present study follows this line of thinking and examines the link between stock market development and the economic growth in Bangladesh as rare studies have done in the context of Bangladesh. The specific objectives of this study are as follows.

- i. To investigate the existence of short run and long run relationships between stock market development and economic growth.
- ii. To examine the direction of causal relationships between stock market development and economic growth.

## **2. Literature Review**

A handsome amount of study resolve on the ambiguous relationship between stock market development and economic growth for the last two decades. Atje and Jovanovic (1993) explore that the stock markets have a positive impact on growth performance for 40 countries over the period 1980-88. They also find a significant correlation between economic growth and the value of stock market trading divided by GDP [9]. Levine and Zervos (1996) shows that stock market development is positive and strongly correlated with long run economic growth [8]. Soon after, Levine and Zervos (1998) reveal that stock market liquidity is positively and comprehensively connected with current and future rates of economic growth using cross-country data for 47 countries from 1976 to 1993. They also find that both stock market liquidity and banking development considerably predict future rates of growth and finally conclude that stock markets provide important but different financial services compared with banks [20]. Garcia and Liu (1999) explore the determinants of stock market development, and the relationship between financial intermediary development and stock market development using pooled data from fifteen industrial and developing countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela, Indonesia, Korea, Malaysia, the Philippines, Taiwan, Thailand, Japan and the United States) from 1980 to 1995 [16]. They comment that economic development plays an important role in stock market development.

The study settles that the stock market is a complement rather than substitute for the banking sector as many East Asian countries are successful examples where the banking sector promotes stock market development. Duca (2007) investigates the casual examination of stock market prices and GDP in developed market economies (US, UK, Japan, France and Germany) using the Granger causality test [21]. He reveals that the variables are likely to move together over time. He also comments that stock prices are appearing to Granger cause GDP, the occurrence of bubbles and busts in financial markets is likely to deteriorate volatility in economic activity. Deb and Mukherjee (2008) examine the causal relationship between stock market development and economic growth for the Indian economy applying the techniques of unit root tests and the long run Granger non-causality test proposed by Toda and Yamamoto [11]. The results of the study expose that there is strong causal flow from the stock market development to economic growth. So, the funds raise by the corporate sector from the financial markets during 1996:Q4 to 2007:Q1 thus play an important role in the appreciable growth registered by the Indian economy. The results also show the bidirectional causality between real GDP growth rate and real market capitalization ratio. By employing the error correction approach, Nurudeen (2009) investigates whether stock market development raises economic growth in Nigeria.

The econometric results indicate that stock market development (market capitalization) contributes positively to economic growth [22]. Hossain and Kamal (2010) investigate the causal relationship between stock market development and economic growth in Bangladesh using the Engle-Granger causality and ML tests [12]. From the analysis, it is found that the stock market development strongly influences the economic growth in Bangladesh economy, but there is no causation from economic growth to stock market development. The unidirectional causality is prevailed between stock market development and economic growth in the Bangladesh economy. Boubakari and Jin (2010) investigate the causality relationship between stock market and economic growth using Granger causality test of the time series data bring together from 5 Euronext countries named Belgium, France, Portugal, Netherlands and United Kingdom for the period 1995:Q1 to 2008:Q4 [23].

The study considers market capitalization, total trade value, turnover ratio as stock market proxies and in contrast, GDP and FDI for economic growth proxies. The outcomes of the study present that the stock market development does significantly Granger cause economic growth in France and United Kingdom. In addition, stock market development does Granger cause economic growth, but not



significant in the Netherlands. But, the causal relationship is rejected for Belgium and Portugal in which the stock markets are small and less liquid. Haque and Fatima (2011) explore the relationship between stock market development and long run per capita growth rate of Bangladesh using the two dynamic panel models for the sample period of 1980 to 2007 [13]. They comment that stock markets in Bangladesh have no influence on the real economic activity during 1980 to 2007. Olweny and Kimani (2011) investigate the causal relationship between stock market performance and economic growth in Kenya for the period of 2001 to 2010 using the Granger causality test based on the Vector Autoregressive (VAR) model [10]. The findings imply that the causality between economic growth and stock market are run unilaterally or entirely in one direction from the NSE 20-share index to the GDP.

From the results, it is inferred that the movement of stock prices in the Nairobi stock exchange reflects the macroeconomic condition of the country and can therefore be used to predict the future path of economic growth. Alajekwu and Achugbu (2012) investigate the role of stock market development on economic growth of Nigeria using 15 years time series data from 1994 to 2008 using Ordinary Least Square (OLS) techniques [24]. The stock market capitalization ratio is used as a proxy for market size, while value traded ratio and turnover ratio are used as a proxy for market liquidity. The results show that market capitalization and value traded ratios have a very weak negative correlation with economic growth, while turnover ratio have a very strong positive correlation with economic growth. Ageli and Zaidan (2013) investigate the link between financial sector development and economic growth in the Saudi economy over the period 1970-2012 by using unit root tests, the co-integration test, the Granger Causality Test and the Vector Error Correction Model (VECM) [25].

The results of the examine show that there is a positive relationship between financial sector development and economic growth in Saudi Arabia. They also comment that the development of the financial system will have a positive impact on the growth of the Saudi economy. Osuala, Okereke and Nwansi (2013) examine the existence of causality relationship between stock market performance and economic growth in Nigeria using the General-to-specific Autoregressive Distributed Lag (ARDL) /Bound testing approach [26]. In particular, it investigates whether the stock market really promotes economic growth in Nigeria using time series data covering the period 1981 – 2011 of the variables, namely, Gross Domestic Product (a proxy for economic growth) and

stock market performance indicators, such as market capitalization ratio, turnover ratio and total number of deals ratio.

The study finds the empirical evidence of long run co-integration between economic growth and stock market performance. However, the study reveals that there is no causality from all of the stock market development indicators to GDP in the long run, while the existence of a unidirectional causality from total number of deals ratio to economic growth in the short run. Jahfer and Inoue (2014) examine the long run relationship between the financial development, stock market development and economic growth in Japan, employing Johansen Co-integration and Vector Error Correction Model [27].

The results reveal that there is a long run equilibrium relationship between the financial development, stock market development and economic growth in Japan and that financial development and stock market development causes economic growth, but there is no evidence of causality from economic growth to financial development or stock market development. In addition, the study finds that stock market development plays an important role during the period 1974-2011 in Japan. Finally they conclude that stock market development is matter for the economic growth of Japan after 1974.

## **2.1. Conceptual Framework**

The economic theory suggests that the stock market impacts on aggregate demand through aggregate consumption, savings and investment. A well-performed stock market must increase savings, which leads to allocate capital to the industries for productive investments, and it must generate new employment, more output, and finally an increase in the rate of economic growth. That is why the study aims at determining whether the stock market development in Bangladesh has any influence on the economic growth. Moreover, a substantial body of literature suggests that financial market development plays a significant role in economic growth through fostering savings mobilization, easing risk management, promoting technological transfer and reducing information and transaction costs [5]. Economic growth is a straightforward concept. It is measured by the growth rate of real GDP at constant prices. Stock market development is a multi-dimensional concept. It is generally evaluated by stock market size, market liquidity, market concentration, market integration and the legal rule in the market.

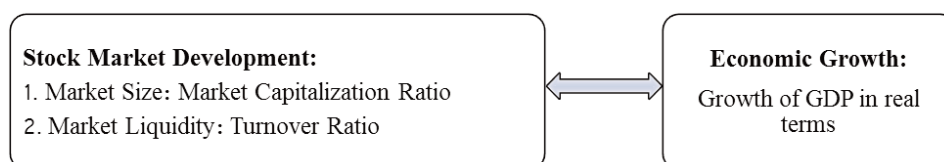
The study uses market size and market liquidity as a measure for stock market development of Bangladesh. Specifically, we use the following indicators of stock

market development:

- **Market Size:** The market capitalization ratio is the main indicator that used as a measure of stock market size and depth. The Market Capitalization Ratio (MCR) is defined as the market capitalization of stocks divided by GDP i.e.,
- In terms of economic significance, market size, i.e., market capitalization ratio is positively related with the ability to mobilize capital and diversify risk on an economy.
- **Market Liquidity:** Stock market liquidity is the ability of a market to easily buy and sell securities without having to reduce its price very much. The turnover ratio is the main indicator that used as a measure of stock market liquidity.
  - i. **Turnover Ratio (TR):** The turnover ratio measures stock market trading compared with the size of the Economy. A small liquid market generally has a high turnover ratio.

The conceptual framework as brought out from the literature review in this study is illustrated in the figure 1 below.

Figure 1: Conceptual Framework



### 3. Methodology and Findings

A number of statistical and econometric tools have been used to realize the objectives of this study. A comprehensive description of these tests and the results have been described in a lucid style here below.

#### 3.1. Data and Data Sources

Bangladesh has two stock exchanges: Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE). Dhaka Stock Exchange is the oldest and largest stock exchange in Bangladesh. Thus, the study purposefully selects DSE as a sample of the stock market of Bangladesh. On the other hand, the performance of the overall economy is targeted and measured by the growth in

GDP in constant prices. The current study concentrates on Bangladesh economy covering a period of thirty four years (1981-2014). Any study of stock market development should preferably be based on monthly data. But given the fact that monthly GDP figures in Bangladesh are not available, the study uses yearly data of GDP growth rate and indicators of stock market development. Stock market development is measured by two proxies: market size (MCR) and market liquidity (TR). In order to calculate the MCR and TR, data of market capitalization and turnover are collected from various issues of the Bangladesh Economic Review published by Bangladesh Bank and [28], while data of GDP in current local prices and real GDP growth rate (GDP) are collected from the World Development Indicators of World Bank (2016).

### 3.2. Data Statistics

This subsection provides descriptive statistics for the data under study and the purpose is to observe the changes that have taken place over the 34 years. The following Table 1 gives a summary of the statistical features of the variables.

*Table 1: Statistical Features of the Variables*

Variable	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	P-value
GDP	4.94	5.06	7.23	2.13	1.28	-0.25	2.51	0.69	0.71
MCR	7.60	2.31	43.99	0.54	10.54	1.88	5.91	32.04	0.00
TR	28.90	19.87	114.31	0.87	30.52	0.95	3.07	5.12	0.08

The positive skewness values for MCR and TR suggest that these variables have right tails, while negative value for GDP growth suggests that the variable is moderately skewed left. Kurtosis for MCR and TR are more than 3, which indicate that the distributions are leptokurtic. The calculated Jarque-Bera statistic and corresponding p values reject the normality assumption for MCR and TR as skewness and kurtosis are significantly different from zero and three respectively, while distribution of GDP growth is normal.

### 3.3. Econometric Analysis

The study uses quite a lot of econometric analysis to investigate the relationship and the direction of causality between the stock market development and economic growth in Bangladesh. Unit root tests and cointegration analysis are used to test the stationarity and multiple long run relationship respectively. Vector Error Correction Model (VECM) is employed to test the long run causality, and short run to long run dynamic adjustment of the system of cointegrated variables.

Granger causality/Block Exogeneity Wald tests based upon VEC model is performed to test the short run causality among the variables.

### 3.3.2. Testing for Stationarity

The first step of the econometric analysis requires a test for stationarity considering that the variables selected in this paper are time series which are usually non-stationary. Two extensively used unit root test, namely, Augmented Dickey Fuller (ADF) and Phillips-Peron (PP) test are employed to avoid the problem of spurious regression and to examine the stationarity of the time series. ADF is the augmented form of Dickey Fuller test. The ADF test is performed using the following equation:

$$\Delta Y_t = \alpha + \beta T + \gamma Y_{t-1} + \delta \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

where  $\alpha$  is an intercept (constant),  $\beta$  is the coefficient of time trend  $T$ ,  $\gamma$  and  $\delta$  are the parameters where,  $\gamma = \rho - 1$ ,  $\Delta Y$  is the first difference of  $Y$  series,  $m$  is the number of lagged first differenced term, and  $\varepsilon$  is the error term.

Phillips and Perron (1988) have developed a non-parametric unit root conception. The PP test is modified from Dickey-Fuller test so that serial correlation does no longer affect their asymptotic distribution. The PP test test is performed using the following equation:

$$\Delta Y_t = \alpha + \beta T + \gamma \Delta Y_{t-1} + \varepsilon_t \quad (2)$$

where  $\alpha$  is a constant,  $\beta$  is the coefficient of time trend  $T$ ,  $\gamma$  is the parameter and  $\varepsilon$  is the error term. The unit root test results are given in the following Table 2. Both

Table 2: Unit Root Test Results

Variables	Augmented Dickey Fuller (ADF)			Phillips-Peron (PP)		
	None	Intercept	Intercept and trend	None	Intercept	Intercept and trend
GDPG	1.27 (.94)	-3.97 (.00)	-8.04 (.00)	-0.85 (.34)	-4.35 (.00)	-9.56 (.00)
MCR	-.54 (.47)	-1.16 (.68)	-2.08 (.54)	-.70 (.41)	-1.31 (.61)	-2.27 (.44)
TR	-1.22 (.20)	-2.07 (.26)	-2.96 (.16)	-1.13 (.23)	-2.03 (.27)	-3.03 (.14)
GDPG	-10.87 (.00)	-4.98 (.00)	-4.87 (.00)	-17.94 (.00)	-20.06 (.00)	-19.36 (.00)
$\Delta$ MCR	-4.73 (.00)	-4.72 (.00)	-4.73 (.00)	-4.65 (.00)	-4.65 (.00)	-4.58 (.00)
TR	-6.43 (.00)	-6.36 (.00)	-6.26 (.00)	-6.43 (.00)	-6.37 (.00)	-6.26 (.00)

Note: MacKinnon critical values for the ADF and PP statistic are used. First bracket shows p-values.

tests are conducted using trend and intercept, intercept, and none term of the models.

The findings of the two tests yield significantly similar results at level and first difference. Nevertheless, both test provides evidence of stationarity of all variables in their first difference. It can be noticed that the null hypothesis of a unit root at the level are accepted in all cases for MCR and TR as test statistics are lower than the critical values. GDP appears to be stationary in the level with intercept, and intercept and trend, however; nonstationary in the level when none term is considered. In order to solve the problem, we have plotted GDP in level using a graph and find that the series has no trend and intercept. Thus, we accept the results without intercept and trend for the both tests, which indicate that GDP also has a unit root in level.

### 3.3.2. Testing for Cointegration

Cointegration refers to the situation where the non-stationary time series of the same order exist a long run relationship. Since it has been determined in the unit root test that the variables under examination are integrated of order 1, the cointegration test is performed. The Johansen cointegration test procedures are used to test for the possibility of a long run equilibrium relationship between stock market development and economic growth. Johansen and Juselius (1990) cointegration approach based the on VAR model is applied to examine the long run relationship that may exist among representative variables [29]. The Johansen and Juselius (JJ) approach of maximum likelihood estimation technique do not split variables between dependent and independent as all the variables are treated as endogenous variables of the VAR models. The JJ approach can be expressed mathematically as:

$$Y_t = \alpha + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (3)$$

where  $Y_t$  is a vector containing  $n$  variables of  $I(1)$  at time  $t$ ,  $\alpha$  is an  $(n \times 1)$  vector of constants,  $A_p$  is an  $(n \times n)$  matrix of coefficients,  $p$  is the maximum lag included in the model and  $\varepsilon_t$  is an  $(n \times 1)$  vector of error terms.

As in [30], Equation (4) can be written in the form of the error correction model assuming cointegration of order  $p$  as:

$$\Delta Y_t = \alpha + (A_1 - I) Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (4)$$

or in a final broad form as:

$$\Delta Y_t = \alpha + \Gamma_1 \Delta Y_{t-1} + \dots + \Gamma_{p-1} \Delta Y_{t-p+1} + \Pi Y_{t-p} + \varepsilon_t \quad (5)$$

Where,  $\Gamma_1 = (A_1 + A_2 + \dots + A_{p-1} - I)$  represents the dynamics of the model in the short run. In Equation 5,  $\Pi = (A_1 + A_2 + \dots + A_p - I)$  represents the long run relationship among the variables included in the vector  $Y_t$ , and  $I$  is the identity vector. The key idea of the JJ approach is to determine the rank of the matrix  $\Pi$ , which represents the number of independent co-integration vectors.

Reference [31] suggests two test statistics named trace and eigenvalue test statistic for estimating the number of co-integrating vectors or equations. The trace and maximum eigenvalue test are as follows:

$$\lambda_{\text{trace}}(r) = -T \sum_{t=r+1}^T \ln(1 - \lambda_t) \quad (6)$$

and

$$\lambda_{\text{max}}(r, r+1) = -T \ln(1 - \lambda_{r+1}^{\text{max}}) \quad (7)$$

where  $T$  is the sample size and  $\lambda_t$  is the eigenvalues.

The trace test statistic hypothesizes that:

$H_0 : r \leq n$  (there are at most  $n$  number of cointegrating vectors)

$H_1 : r > n$  (there are at least  $n$  number of cointegrating vectors);

and the eigenvalue test statistic hypothesizes that:

$H_0 : r = n$  (there are exactly  $n$  number of cointegrating vectors)

$H_1 : r = n+1$  (there are exactly  $n+1$  number of cointegrating vectors).

In order to estimate the equation (5), an appropriate lag length must be determined as [32] argue that the number of cointegrating vectors generated by Johansen approach may be sensitive to the number of lags in the VAR model. Thus, five different criteria, namely Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criteria (AIC), Schwarz Information Criteria (SIC) and Hannan-Quinn Information Criteria (HQ) are used to determine the lag lengths used in the VAR. Table 3 presents the results for each criterion with a maximum of 4 lags. It is clear that LR, FPE, AIC and HQ criteria stand in favor of 4 lags, while SIC criteria suggests for only 1 lag.

Table 3: Optimal Lag Lengths of the VAR Model

Lags	LogL	LR	FPE	AIC	SIC	HQ
0	-293.4954	NA	77095.82	19.76636	19.90648	19.81119
1	-253.6893	68.99732	9934.603	17.71262	18.27310*	17.89192
2	-245.8407	12.03446	10960.14	17.78938	18.77022	18.10316
3	-237.4956	11.12680	12074.50	17.83304	19.23424	18.28130
4	-220.3042	19.48357*	7764.191*	17.28695*	19.10850	17.86968*

Note: \* indicates lag order selected by the criterion.

The presence of residual serial correlation makes the result less efficient. Thus, we proceed to conduct Lagrange Multiplier (LM) tests for each suggested lags up to maximum 4 lags (Table 4). The p-values associated with the LM tests strongly reveal the presence of serial correlation in the estimated residuals generated from VAR (1) model. In contrast, 4 lags produce no autocorrelation in the VAR model for up to 4 years. So, we accept VAR (4) model for cointegrating analysis.

Table 4: Residual Serial Correlation LM Tests for the VAR Model

Lags	4 Lags		1 Lag	
	LM-Stat	P-Values	LM-Stat	P-Values
1	7.353439	0.6004	16.49633	0.0572
2	5.864296	0.7534	4.713057	0.8586
3	8.537068	0.4811	20.88533	0.0132
4	9.322212	0.4081	9.189561	0.4200

Note: P-values from Chi-square with 49 df.

Table 5: Johansen Multivariate Cointegration Test Results

Panel (a): Unrestricted Co-integration Rank Test (Trace)					
Hypothesized No. of CE(s)		Eigenvalue	Trace Statistic	0.05 Critical Value	P-value***
H <sub>0</sub>	H <sub>1</sub>				
r = 0	r ≥ 1	0.596049	31.72904**	29.79707	0.0296
r ≤ 1	r ≥ 2	0.146107	5.441667	15.49471	0.7603
r ≤ 2	r ≥ 3	0.029258	0.861133	3.841466	0.3534
Panel (b): Unrestricted Co-integration Rank Test (Maximum Eigenvalue)					
Hypothesized No. of CE(s)		Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	P-value***
H <sub>0</sub>	H <sub>1</sub>				
r = 0	r = 1	0.596049	26.28738*	21.13162	0.0086
r = 1	r = 2	0.146107	4.580534	14.26460	0.7936
r = 2	r = 3	0.029258	0.861133	3.841466	0.3534

Notes: \* and \*\* denotes rejection of the null hypothesis at the 1% and 5% levels respectively. \*\*\* indicates MacKinnon-Haug-Michelis (1999) p-values.

Table 5 presents particularized results of co-integration test, including the trace test (Panel-a) and the maximum eigenvalue test (Panel-b). A visual inspection of Panel-a in Table 3 reveals that the null hypothesis of there are at most 1 number of co-integrating vector can be rejected since the  $\lambda_{\text{trace}}$  statistics of 31.72904 is greater than its critical value of 29.79707 at the 5% level of significance.



Similarity, Panel-b in Table 5 shows that the null hypothesis of there is exactly one co-integrating vector can be rejected at the 1% level of significance. Thus, both the trace and maximum eigenvalue test suggest for 1 co-integrating vector in the system. Consequently, it can be assumed from the Johansen co-integration test that there is at least one co-integrating vector in the system indicating that there is at least one long run relationship among the variables preferred for the study.

Table 6: Normalized Co-integrating Coefficient

Co-integrating Equation(s): Log likelihood: -208.3761			
GDP	C	MCR	TR
1.000000	-3.980490	-0.027965	-0.023297*
		(0.03245)	(0.00433)
		[-0.86192]	[-5.38018]

Note: Standard errors in () and t-statistics in []. \* denotes significance of variable at 1 % level

The normalized co-integrating coefficient gives the long run relationship and this is reported in Table 4. Based on the estimated co-integration vector, the actual long run relationship can be represented by:

$$\text{GDP} = 3.980490 + 0.027965 \text{ MCR} + 0.023297 \text{ TR} \quad (8)$$

Table 6 and Equation (8) indicate that long run relationship exist between stock market development based and real economic growth in Bangladesh. In the long run, TR has a significant and MCR has an insignificant long run positive relationship with real economic growth. The result implies that a 1% increase in market capitalization ratio and turnover ratio contribute 0.03% and 0.02% increase in real economic growth in Bangladesh respectively.

### 3.3.3. Vector Error Correction Model (VECM)

Vector Error Correction Model (VECM) is employed to investigate the long run causality and short run to long run dynamic adjustment of the system of co-integrated variables. In an effort to determine the short run causality among the variables, Granger causality/Block Exogeneity Wald tests based upon VEC model is also performed. A VECM is a restricted vector autoregressive (VAR) model designed to deal with nonstationary series that are known to be cointegrated. The presence of cointegration indicates that at least one of the variables would react to deviate from the long run relationship. The VEC mechanism explains how the examined model adjusts in each time period towards

its long run equilibrium state. Equation (4) can be written as a VECM as:

$$\Delta Y_t = \alpha + \sum_{i=1}^p \Gamma_i \Delta Y_{t-i} + \Pi Y_{t-p} + \varepsilon_t \quad (9)$$

where  $\Gamma_i = A_1 + A_2 + A_3 + \dots + A_{p-1} - I$  represents the dynamics of the model in the short-run and  $\Pi = A_1 + A_2 + A_3 + \dots + A_p - I$  is the long-run relationship among the variables included in the vector  $Y_t$  and  $I$  is the identity vector.  $\Delta Y_t$  is an  $n \times 1$  vector of variables and  $\alpha$  is an  $(n \times 1)$  vector of constants.  $\Pi$  is the error correction mechanism, which has two components:  $\Pi = \mu\beta'$  where  $\mu$  is an  $(n \times 1)$  column vector representing the speed of the short run adjustment to the long-run equilibrium, and  $\beta'$  is a  $(1 \times n)$  co-integrating vector with the matrix of long run coefficients.  $\Gamma$  is an  $(n \times n)$  matrix representing the coefficients of the short run dynamics. Finally,  $\varepsilon_t$  is an  $(n \times 1)$  vector of white noise error terms, and  $\rho$  is the order of the auto-regression.

The estimates of the VEC model with GDP, MCR and TR are presented in Table 7. The long run causal relationship is implied through the significance of the lagged error correction terms. Error correction term contains the long run information since it is derived from the long run co-integrating relationship. The results of the estimated multivariate VECM clearly indicate that the error correction terms of the first difference Real GDP growth equation is correctly signed (negative) and statistically significant at the 1 % level of significance. On the other hand, market capitalization ratio and turnover ratio equations are not correctly signed, however; statistically significant. The results confirm that a unidirectional long run causality is running from stock market development to real GDP growth in Bangladesh.

Table 7: Vector Error Correction Estimates

Error Correction	D(GDP)	D(MCR)	D(TR)
Coint. Eq.	-1.391509*	5.758935**	28.76262*
Standard errors	0.49912	2.45399	8.71444
t-statistics	-2.78794	2.34677	3.30057
P-value	0.0077	0.0234	0.0019

Note: \* and \*\* denote significance of variables at 1% and 5% levels respectively.

A negative error correction term also signifies the speed of dynamic adjustment of a system of the co-integrated variables from the short run to the long run equilibrium level. So, about 139% of disequilibrium is corrected each year by

changes in real GDP growth. The calculation also indicates that real GDP growth in Bangladesh takes only 8 and half months to converge to its long run equilibrium.

Table 8: VECM Granger Causality/Block Exogeneity Wald Tests

Dependent Variable	Excluded	Chi-Square Statistics	Degrees of Freedom	P-value
	D(MCR)	2.739249	4	0.6024
D(GDP)	D(TR)	10.80825	4	0.0288**
D(MCR)	D(GDP)	10.68767	4	0.0303**
D(TR)	D(GDP)	14.12965	4	0.0069*

Note: \* and \*\* denote singnificance at 1% and 5% levels respectively.

In a VEC model, lagged explanatory variables produce another possible sources of causality named short run causality. In an effort to determine the short run causality among the variables, Granger causality/Block Exogeneity Wald tests based upon VEC model is performed. This test detects whether the lags of one excluded variable can Granger cause the dependent variable in the VAR system using the chi-square (Wald) statistics. According to the test results in Table 8, the individual short run causal effect from stock market development based on TR to real GDP growth is significant based on the chi-squared statistics and p-values. Moreover, the short run causal effects of real GDP growth to MCR and TR are significant at 1% and 5% levels respectively. So, there is a unidirectional causality running from GDP to MCR, while there is a bidirectional causality running between GDP to TR.

#### 4. Conclusion

This study examines the existence of short run and long run relationship between stock market development and economic growth in Bangladesh. Moreover, this study also investigates the direction of causal relationships between stock market performance and economic growth in Bangladesh. Johansen multivariate cointegration test, VECM and Granger causality/Block exogeneity Wald test based on VECM approach are employed to investigate the linkages between stock market performance and economic growth. Cointegration test confirms that the market capitalization ratio and turnover ratio have a positive long run effect on real GDP growth. So, we conclude that stock market development based on MCR (market size) and TR (market liquidity) contributes to real economic growth in the long run. VECM result reveals that about 139% of disequilibrium is corrected each year by changes in real GDP growth. VECM also indicates that long run

causality is running from stock market development to real GDP growth. Granger causality/Block exogeneity Wald tests based on VECM approach reveal that there is a there is a bidirectional short run Granger causality running between GDP to stock market development in Bangladesh.

The results of cointegration test lead some sorts of support to empirical studies of [8], [9], as well as some other studies and theory that the stock market has direct association with GDP growth rate. The results of the present study also consistent with [11] and [21] as well as some other studies that stock market and GDP growth rate have a causal association with each other. Our findings are not consistent with the results of [23] as they reject any direction of causality between stock market and economic growth in the countries where the stock markets are small and less liquid. Contrary to [13], this study finds an evident similar to [12] that stock market development causes economic growth in Bangladesh. Though the contribution of the stock market in Bangladesh related to money market is still in a transition period, an impressive track record in real economic growth and stock market performance over the last two decades prompt each other indeed. Thus, policymakers of Bangladesh should give a boost to the stock market such that it functions smoothly since a well functioning stock market is expected to contribute on economic growth better than the results of this study demonstrate.

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## Infrastructure and Mega Projects: Building our Future

NIRMAL CHANDRA BHAKTA\*  
AMITABH CHAKRABORTY\*\*  
BIRENDRA CHANDRA DAS\*\*\*

**Abstract:** *Our economy had been unable to gain the momentum as dreamed by our greatest leader of all time as well as the aim of us all including the freedom fighters, martyrs or alive. After being stumbled time to time, present government has strong and effective taken steps to boost-up our economy through taking many significant mega projects. The mega projects are of three categories – projects those are already under implementation; projects, which have been passed for implementation and projects, which are under strong consideration of government for implementation. In this paper, we have considered those projects, which are already under implementation and also have tried to focus on impacts regarding implementation of these projects with a relation to our economic growth. Considering the theme of this conference role of ethics in this regard has been included as well. Undoubtedly, these projects will ensure sustainability of our economic growth, human well-being and the achievement of a sustainable future. These steps will be a milestone for the intellectual history of our nation.*

### 1. Introduction

Our economy had not been able to gain the momentum as dreamed by the father of the nation, Bangabandhu Sheikh Mujibur Rahman. In fact, this has been the aim of those who fought for freedom of the country and those who sacrificed their lives in the liberation war in 1971. Now this is the dream of all Bangladeshi who

\* Executive Director (on PRL), Bangladesh Bank

\*\* Joint Director, Bangladesh Bank

\*\*\* Deputy Director, Bangladesh Bank

love this country from the core of their hearts. This dream, since 1975, has stumbled many times due to various banners, which we would not like to mention in this paper. However, making the dream true is always possible when the common people, led by a great leadership, dream it. We, with those dreams, are united under the great leader, Honorable Prime Minister Sheikh Hasina, at this moment and things seem to be gaining momentum to make these dreams realistic.

## **2. How it Got the Speed**

The present government has come in power for the second straight term in 2014. After that, the present government allotted to host of mega infrastructural projects. These projects were chosen with a view to transform the future of the country and to change the course of national progress for good.

In the meantime, good number of projects has been put under the quick-implementation scheme, which have been foreseen, introduced and supervised by Honorable Prime Minister herself. This is resulting in full swing progress being accomplished in a space of three years. The government has given top priority to the mega projects and an amount over USD 2.3 billion has been set from national budget of FY 2015-2016 for fast-track implementation of these projects. During the session in which this budget was declared, a special booklet 'Mega Projects in Transforming Infrastructure: New Dimension in Accelerating Growth' was placed in the National Parliament and such thing happened for the first time in our parliamentary history.

The mega projects are of three categories – projects those are already under implementation; projects, which have been passed for implementation and projects, which are under strong consideration of government for implementation. In this paper, we have considered those projects, which are already under implementation and also have tried to focus on impacts regarding implementation of these projects with a relation to our economic growth. Considering the theme of this conference role of ethics in this regard has been included as well.

## **3. Projects under Implementation**

Nine mega development projects by the government are well underway and are expected to have significant positive impact for the country. Seven of these top priority Fast Track Projects costing around \$40 billion have now gained pace, although some of them are a few years behind the schedule. The projects are the Padma Bridge, Rooppur Nuclear Power project, the Sonadia Deep Sea Port, Payra Sea Port, the Coal Fired Large Power Projects of Matarbari and Rampal, Metro

Rail and LNG Collaboration Terminal. In first quarter of 2016, another project — Padma Bridge Rail Link project — was included in the fast-track project. ECNEC approved the scheme, worth of Tk. 349.88 billion, on March, 2016.<sup>1</sup> Our views regarding these projects along with some facts are given here project-wise.

### **3.1. Padma Multipurpose Bridge**

The Padma Bridge is a multipurpose road-rail bridge across the Padma River to be constructed in Bangladesh. When completed it will be the largest bridge in Bangladesh and the first fixed river crossing for road traffic. It will connect Louhajong, Munshiganj to Shariatpur and Madaripur, linking the south-west of the country, to northern and eastern regions. The Project will build the first fixed crossing across the Padma River for road traffic comprising (a) a two-level steel truss composite bridge 6.15 km long, the top deck to accommodate a four-lane highway and the lower deck to accommodate a single-track railway to be added in the future; (b) 12.0 km of approach roads, 1.5 km on the Mawa side and 10.5 km on the Janjira side; (c) bridge-end facilities including toll plazas and service areas; and (d) river training with dredging and bank protection works, 1.5 km on the Mawa side and 12 km on the Janjira side, to regulate flow and prevent damage to the bridge structure. The Project will also have a component to develop cost-recovery mechanisms to ensure investment sustainability and to carry out institutional capacity building to ensure sustainable asset management. On 07 August 2016, the first span of the superstructure of the bridge reached Mawa site from China. 41 spans are required for the 6.15-km superstructure of the bridge and all the spans will come from China. On a monthly basis, 1-2 spans will come from China every month. The weight of each 150-metre span is some 2,900 tonnes. The spans are being made of steel plate with 20-80 mm thickness in a Chinese factory.

As of December, 2016, overall implementation progress marked around 37% progress. 65% work of the approach road at Jajira point and 73% of work at Mawa point have also been completed. Capable of standing against floods and earthquakes, this mega project means a symbol of hope, height, pride and change of fate for around 30 million southern lives.

With more than one-fourth work already accomplished, the dream for the largest and the longest infrastructure undertaking in Bangladesh—Padma Multipurpose bridge- has started to appear as a distinct reality now. Completely a self-funded

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<sup>1</sup>. 7 Mega projects gaining pace Padma Bridge makes significant progress; Metro rail to complete early; 2 more schemes included in fast-track list; Sharier Khan, Hasan Jahid Tusher and Partha Pratim Bhattacharjee; The Daily Star; May 14, 2016.

project worth \$3.65 billion, the bridge site is filled with laborers, workers and engineers who are toiling hard day and night to get it open for traffic by 2018. The construction of the bridge over the Padma River is a top priority development agenda for the Government of Bangladesh (GoB) that will not only benefit the southwest region but the country as a whole.

### **3.2. Rooppur Nuclear Plant**

As published in the Daily Sun on 07 October 2016, Bangladesh is in the process of solving its power deficit problem to ensure smooth economic development as well as well being of the people. Even in the recent past the country was almost fully dependent on gas-based power generation. From environmental considerations gas is one of the preferred fuel options, no doubt. But, the source is not unlimited. Rapidly depleting gas reserve compels Bangladesh to go for diversification of its energy mix. In the present world, while planning an energy mix every country needs to actively consider the environmental pollution issues mainly green house effect, which has become one of the greatest threats to our planet. According to the Power System Master Plan – 2010, Bangladesh aims for 24,000Mw of capacity by 2021 and 39,000Mw by 2030. Along with other sources like gas, coal, liquid fuel, renewable resources the country has decided to go for nuclear as well. This is a prudent and pragmatic step by the Government towards meeting up the rising energy demand as well as environmental protection.

The Rooppur Nuclear Power Project, involving a plan to produce 2,400 Mw of electricity, has made significant progress in 2016. A financing agreement of US\$12.65 billion has been signed with Russia in December, 2016. The first and second agreements of the project covering feasibility evaluation, environmental impact assessment, engineering survey, technical documentation and working documentation have been fully completed. On 26 July 2016, Russia and Bangladesh signed an \$11.38 billion loan.

Russian state company Rosatom began working at Rooppur in mid-2013 and is currently undertaking a techno-feasibility study under a half-a billion dollar loan. Rosatom's sister concern Atomenergoproekt, which is undertaking the study has recently floated a tender for engineering survey, environmental monitoring and development of project documents for the Rooppur NPP site. The government expects the main construction of the nuclear reactor to start in early 2017 and complete by 2020. Moreover, Bangladesh has also been sending 20 students every year for the past three years to Russia to get training to run the nuclear power plant.

Bangladesh with the support from Russia is going to build its first nuclear power plant consisting of two units, each of 1,200MW capacity at the western part of the country at Rooppur of Pabna district. Russian company Atomstroyexport (ASE), Rosatom State Corporation Engineering division, has been entrusted with the implementation of the project using latest generation 3+ technologies. First nuclear energy is expected to be injected to national grid in 2023. Another nuclear power plant in the southern part of the country is under active consideration.

According to IEA, operation of all nuclear power plants in the world during the last 45 years has made it possible to prevent blow-out of 56 gigatonnes of carbon dioxide (CO<sub>2</sub>), which is equal to two-year volume of global emissions at the current energy output rate. Moreover, if we take into account all Russian-designed nuclear power plants up to 2030 then the volume of prevented emissions will account for 2.4 billion tons of CO<sub>2</sub> per year, which is equal to 80% of global car fleet outbursts.

As planned, Rooppur plant will have two cooling towers allowing it to use a small quantity of water from the river Padma, thereby minimally affecting the ecosystem. Water required for cooling will be preserved in an artificial reservoir and the water will be recycled continuously. The water temperature level at the reservoir will be maintained within permissible limit. So far spent fuel and nuclear waste management is concerned, the latest technology will be used at Rooppur Project and Russia will take back the spent fuel for reprocessing.

It may be mentioned here that during the entire life-cycle of the Plant, no negative effect on the environment was recorded. Dr. M A Matin, General Secretary, Bangladesh Poribesh Andolon (BAPA) after his recent visit of the Novovoronezh NPP site remarked, “The proposed first future Bangladesh nuclear power plant at Rooppur is supposed to be the improvised replica of this plant (Novoveronezh). I hope the Rooppur plant will have the same or better quality environmental managements. Side by side, minimisation of potential hazards from accidental burst, natural disasters & carriage of nuclear waste need to be ensured.” Each Bangladeshi shares Dr. Matin’s expectation from Rooppur Nuclear Plant.

### **3.3. Deep Seaport**

As mentioned in news published in the Diplomat on 07 June 2016, Bangladesh needs a deep sea port. The country has one of world’s fastest growing economies, which is expected to rise at a 7.1 percent clip this year. It is on Goldman Sachs’s list of the “Next 11” emerging economic powerhouses of the 21st century. On the strength of the second-most dynamic textile industry on the planet, Bangladesh’s

export sector is booming, and is expected to eclipse US\$ 50 billion per year in value by 2021. This is all in a country without adequate maritime infrastructure.

Bangladesh has never built a new port in its 45-year history as an independent state. Annual trade of US\$ 60 billion currently pours through the country's two existing seaports, Chittagong and Mongla. Both of these are too shallow for large container ships and require costly load transfers to smaller vessels to get cargo in and out. This added step can cost an additional US\$ 15,000 per day and severely decreases the ports' global competitiveness.

### **3.3.1. Sonadia Deep Seaport**

A few years following 2009, Japanese survey in Sonadia, an island near Cox's Bazar in the south of the country, which determined it a suitable location for a deep-draft port. China Harbor Engineering Company, a subsidiary of the state-owned China Communications Construction Company—the same enterprise that is building Colombo Port City in Sri Lanka, and which also happens to be blacklisted by the World Bank on allegations of corruption—was chosen as the developer, and Bangladesh appeared to have given China the green light.

During the visit of Prime Minister Sheikh Hasina in Beijing, in 2014, it was widely assumed that a deal for Sonadia was going to be formally signed, but then it wasn't. Due to the unpleasant reason, in February, 2016 Bangladesh made the formal announcement that it had been scrapped. Then the GoB decided that deep-sea port at Sonadia of Cox's Bazar will be implemented on a government-to-government basis. To this end, a ten-member committee, headed by the Principal Secretary of Prime Minister's Office, was formed to evaluate the proposals, and its construction work will start soon. A techno-economic study was carried out by Pacific Consultants International of Japan to construct the deep-sea port.

### **3.3.2. Payra Deep Seaport**

As mentioned in news published in the Diplomat on 07 June 2016, originally seeming like a condolence prize for China, which had been beaten out for a deep sea port in the south of the country by Japan, Bangladesh proposed a deep seaport at Payra, which is located on the northwestern coast of the Bay of Bengal. The construction of this port, which was being financed on a public-private partnership (PPP) platform, was originally granted to a Chinese company. The Payra Deep Seaport was then reconfigured as a cooperative port that many different countries could invest and operate terminals in Bangladesh. As usual, after some dramatic and unpleasant situation, the government has signed a

memorandum of understanding (MoU) with Belgian company Jan De Nul to implement the Payra Deep Seaport, for an estimated USD 2.00 billion capital dredging and maintenance dredging.

Given that the entire scheme was divided in 19 components, 13 components will be implemented under FDI and the remaining six under the government-to-government (G2G) deals. Meanwhile, a British company HR Wallingford has completed the feasibility study for Payra Deep Seaport. This would guide the government in finalizing the implementation plan. Construction works for the deep sea port will be implemented through 19 different tenders. Meanwhile, the government is reviewing merits of proposals from China, UK, Belgium, Netherlands, Denmark and India. The government has set short-term, mid-term and long-term goals for the port. In short-term, this year the government would facilitate outer anchoring of clinking, fertilizer and other bulk ships. In mid-term, the government would complete building a multipurpose and bulk terminal infrastructure by 2018 at a depth of 10 meter channel through dredging. By 2023, a full deep sea port facility of 16 meter channel will be operational.

### **3.4. Matarbari Power Project**

Bangladesh had granted a contract to Japan<sup>2</sup> to build a power project at Matarbari, just 25 kilometers away. Japan International Cooperation Agency (JICA) is to build the port along with a liquefied natural gas terminal, a series of four 600 Mw coal-fed power plants, as well as rail lines, roadways, and electrical systems as part of a monumental infrastructural package deal. The master plan is that the port would be used to receive coal, which could power an entire new industrial zone in the far southeast of the country. To make this happen, JICA offered a loan to take care of USD 3.7 billion out of the total USD 4.6 billion price tag, at 0.1 percent interest for 30 years and a 10-year grace period thrown in on top of that, according to the South China Morning Post. The government has nominated the Coal Power Generation Company of Bangladesh Limited (CPGCBL) to implement the power project with using 3.73 million tonnes of coal annually. The government has a plan to construct a seaport at Matarbari for loading and unloading of coal.

Since the inception of this project in 2014, the government's Coal Power Generation Company has acquired 1500 acres of land for this cause. 90% of

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2. 7 mega projects gaining pace Padma Bridge makes significant progress; Metro rail to complete early; 2 more schemes included in Fast-track list; Sharier Khan, Hasan Jahid Tusher and Partha Pratim Bhattacharjee; The Daily Star; May 14, 2016. Building Bangladesh's Future: Infrastructure and Mega Projects in 2016; Published on Thursday, 05 January 2017.

boundary fencing of the project site has been completed while the appointment of the project's consultant is being finalized. A contractor has been selected in February to complete power plant. Works are well underway to complete the port site preparatory works and contracts for power evacuation and building a power substation. With a price tag of D4.6 billion, this plant will come with its own deep seaport to facilitate import of coal. The project will be completed by 2022.

### **3.5. Mass Rapid Transit**

With an aim to provide a safe, fast, affordable and modern means of transportation for the city dwellers, this new urban public transport service promises to significantly reduce congestion in the capital and prevent environmental pollution. The Dhaka Mass Rapid Transit Development Project, official name of the metro rail scheme, stretches from Uttara to Motijheel, and involved USD 2.5 billion. The mode of transport is expected to see half of the 20 km metro line go open by the end of 2019.

Through the inauguration of the construction work by Honorable Prime Minister Sheikh Hasina, a formal commencement of ground development for a depot began on 26 June 2016. The depot is the foremost component to be in place for building the metro rail service system, as metro trains will be launched on the elevated lines from the depot. The entire metro rail route including all 16 stations will be elevated. Only the depot will be on the ground. A Japanese firm, Tokyo Construction Ltd is carrying out the depot land development work.

With every metro rail train comprising of six air-conditioned spacious cars, a city commuter will travel between Motijheel and north Uttara in 37 minutes and there will be a train every four minutes at each of the 16 stations on the way in both directions. A total of 24 trains will together transfer 60,000 passengers every hour on both directions. The project formalized as Dhaka Mass Rapid Transit, otherwise known as Mass Rapid Transit (identified as MRT line-6 in the Strategic Transport Plan), is being implemented by the government-owned Dhaka Mass Transit Company Ltd with Dhaka Transport Coordination Authority as the supervisors. Line-1 to be completed in the second phase, this line will set up lines from Dhaka airport to Kamalapur at first, extending eventually to connect Gazipur, Kamalapur Keraniganj's Jhilmil Residential Area and Khilkhet to Purbachal Residential Area. A high-level delegation from Japan International Cooperation Agency (JICA) is set to arrive in Dhaka on 08 January 2017 to sign a deal to finance the construction of the second Metro Rail of the Mass Rapid Transit (MRT) line-1. A pre-feasibility study has been completed by JICA.



According to the report, the MRT will reduce the travel time to a mere 23 minutes from Dhaka airport to Kamalapur while going from Purbachal to Kamalapur will take just 39 minutes. Line 5 is going between Bulta and Badda, the MRT Line 5, stretched up to 35 kilometers, will have stopovers at Mirpur, Gabtoli bus terminal, Dhanmondi, Basundhara city mall and Hatirjheel link road. Already underway, the feasibility study of the second and third metro rail MRT Line 1 project was scheduled to be completed by 2016 and construction work is scheduled to begin in 2017 and completed by 2025. The MRT Line 2 is the fourth metro rail that will be constructed to connect Ashulia, Savar, Gabtoli, Dhaka University, DSCC Nagar Bhaban and Kamalapur at a length of 40 kilometres which will directly connect Dhaka EPZ to Kamalapur ICD.<sup>3</sup>

Line 4: To be set up at a stretch of 16 kilometre, the MRT Line 4 will enclose the route between Kamalapur and Narayanganj. With certain parts to be set up underground, construction work for the fourth and fifth metro rail will be completed by 2035.

The Seventh Five-Year Plan (2016-2020) recognizes the urban challenges to growth particularly those linked to the Dhaka city transport system; the vision is to develop a multi-modal integrated and safe transportation system in Dhaka. Policy improvements, better traffic management measures and increased public transport including metro-rail are part of that strategy outlined in the Strategic Transport Plan (STP) for Dhaka of 2005. The government is currently updating the STP to the RSTP with the support from Japan International Cooperation Agency (JICA). The RSTP recommends, in addition to the measure proposed by STP and considering the higher than expected growth of population and traffic in Dhaka, construction of selected arterial and ring roads and improvement of the public transport system.

The Dhaka Metro Project will finance the construction of a metro line in Dhaka as the backbone public transport system in an integrated urban transport system for the city. The Dhaka Metro Project will improve the urban transport system by constructing a high-capacity metro line, which will be integrated with the Mass Rapid Transit (MRT) and Bus Rapid Transit (BRT) lines under construction. The development of the metro line as an environmentally friendly, safe and reliable mode of transport will be based on the findings of the Revised Strategic Transport Plan (RSTP) and coordinated with further investments by development partners. It will also be coordinated with the proposed urban development and land use

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<sup>3</sup>. Building Bangladesh's Future: Infrastructure and Mega Projects in 2016; Published in The Daily Star on 05 January 2017.

strategies and will promote a high level of integration with other modes of public transport and road transport. The metro line will be integrated with the railway system to serve as an environmentally friendly, reliable and safe access to railway services. The tariff for the metro shall be integrated with other modes of public transport.

The project is in line with ADB's Country Partnership Strategy 2011-2015, as it supports easing congestion in Dhaka by improving public urban transport. The project is a large stand-alone project, which will be processed as a multi-tranche financing facility (MFF) to finance slices of long-term contract packages with a long-term implementation plan (time-slicing). The RSTP will serve as the basis to finalize the road map and policy framework for the MFF during project preparation. Financing the Dhaka Metro Project, as a time-sliced MFF is more suitable than other financing modalities, as the project requires an investment of at least US\$2.5 billion with ADB's financing share amounting to D1 billion. ADB financing is required over an implementation period of 7 to 8 years, hence time-slicing ADB's investments into three tranches accommodates the restrictions of ADB's financing envelope for Bangladesh, reduces commitment charges for the Borrower, and enables a continuous policy dialogue with the government.

### **3.6. Rampal Power Station**

The Rampal power station is a proposed 1320 Mw coal-fired power station at Rampal Upazila of Bagerhat District in Khulna. It is a joint partnership between India's state owned National Thermal Power Corporation and Bangladesh Power Development Board each have 15% equity, while the remaining 70% of the total funding is expected to come from bank loans. The joint venture company is known as Bangladesh India Friendship Power Company (BIFPC). The proposed project, on an area of over 1834 acres of land, is situated 14 kilometers north of the world's largest mangrove forest Sundarbans which is a UNESCO world heritage site. It will be the country's largest power plant and is scheduled to be operational from 2020.

In August, 2010, a Memorandum of Understanding was signed between Bangladesh Power Development Board (BPDB) and India's state-owned National Thermal Power Corporation (NTPC) where they designated to implement the project by 2016. On 29 January 2012, the Bangladesh Power Development Board signed an agreement with NTPC to build the plant. The joint venture company is known as Bangladesh India Friendship Power Company (BIFPC). The BPDB and the NTPC agreed to implement the project on a 50:50 equity basis. The NTPC will

set up and operate the plant. Bangladesh and India will equally share up to 30 per cent of the capital of this project as equity. The remainder of the capital, which might be equivalent to US\$ 1.5 billion, will be taken as bank loans with help from the NTPC. According to the sources in the Bangladesh Power Division, the joint venture company will enjoy a 15-year tax holiday.

3.7. A news published in the Financial Express on 14 February 2017 mentioned that the Asian Development Bank (ADB) has assured the official agency concerned of providing nearly USD800 million loan to it for setting up an 800-megawatt (MW) LNG-based power plant in Khulna. Power Division officials held a meeting with the ADB Mission where the lender had assured them of the loan for the power plant project. A Consultation Mission from the ADB met the Power Division, Economic Relations Division (ERD) and other relevant agencies during its more than a week-long visit to Dhaka, they said. The North-West Power Generation Company Limited (NWPGL) has taken the project to set up the power plant, to be run by liquefied natural gas (LNG). It will have dual-fuel provision so that the plant could also be operated by oil during any crisis of gas supply. A senior Power Division official said the power plant would cost nearly USD1.0 billion where the government's contribution is expected to be D200 million. Bangladesh is heavily dependent on its limited natural gas for generating power over the years. Since gas is depleting fast against the backdrop of its growing demand every year, the government has decided to set up power plants based on imported LNG, coal and oil.

#### **4. Impact of These Projects on Our Economy**

It started from Padma Multipurpose Bridge to the first ever nuclear power plant of Bangladesh along with the deep sea port are some of such infrastructure and mega projects – which were rolled out to boost up our national progress having substantial progress last year (2016). Such projects have present and future impacts like:

- Changing lives in long deprived regions;
- Opening horizons for businesses fast;
- Creating huge employment opportunities and
- Causing steep rise in inflow of international investment.

These matter a lot for us as will add further momentum to the national growth of our country.

The impacts of the mentioned mega projects are given below:

#### 4.1. Padma Multipurpose Bridge

Impact of this project on our GDP is shown below:

- Will significantly benefit various sectors of the economy of Bangladesh<sup>4</sup>. This will provide direct links between two major seaports of the country and connects missing links for Tamabil-Sylhet-Sorail-Kanchpur-Dhaka-Mawa-Bhatiapara-Norail-Jessore-Benapole highway and will be an integral part of the Asian Highway No 1 and Trans-Asian railway network systems. This will certainly strengthen links between the southwest and north-central zones of the country.
- Will enhance freight, passenger, railway transportation, and utility crossings (high pressure gas transmission, high voltage power transmission, and optical fiber telecommunication cable) between Dhaka and major points in the southwest zone and contribute substantially to the development of the southwest zone as well as to the national and regional economic growth.
- Will reduce the distance from Dhaka to nearly all major destinations in the southwest region by 100 kilometers (km) or more. This will bring considerable savings in passenger and commodity movement time and costs, as well as vehicle operation and maintenance costs. This will also play significant role in lengthening the useful life of vehicles, savings in fuel consumption, and reducing the air emission.
- Will reduce bank erosion and the incidence of worsened vulnerability and poverty among people affected by bank erosion, through riverbank protection.
- Will promote industrial and commercial activity and improve economic and employment opportunities for local people, through economic development of the southwest by constructing the bridge. There will also be better access to healthcare facilities available at Dhaka.
- Will make communication easier that will help to expand education and

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4. The southwest zone of Bangladesh is isolated from other parts of the country by the Padma River. Due to this the southwest zone of Bangladesh remains beyond the advantages of integrated road network, despite of substantial improvements and development in the road network of this zone which is currently the linked with the rest of the country across the Padma River and linked only by ferry. The capacity of ferry services is very limited, and waiting time at ferry ghats is more than 2 hours for buses and light vehicles and more than 10 hours for trucks. In addition, the Riverbanks of the Padma are very unstable, especially in the south side (Janjira) and the River width changes frequently, leaving approach ghats seasonally inoperative. These conditions have made expansion of existing ferry terminals difficult.

training facilities, and the resulting skills development will ensure the availability of high-skilled workers.

- Will reduce social, economic, and industrial underdevelopment of the southwest zone that encompasses Bangladesh's second major port, Mongla; its third main city, Khulna; and the inland port at Benapole.

Note that as per ADB publication, the Environmental Impact Assessments (EIA) indicated some impacts like – destruction of total 177,676 trees (excluding 136,218 banana and 200,629 bamboo); loosing fish production of about 6.95 MT/Year as a total of 65 ponds (4.5ha) and 88 derelict ponds (4ha) will be affected; affecting 2 endangered species, namely Shushuk (Dolphin) & Gangetic Gharial, as Padma is a secondary habitat of these as well as hilsha fish as Padma River is an important migratory route for this; affecting 3280 households as a result of land acquiring and requisition of land by 755ha and 163.1ha, respectively; loosing agricultural production of about 5,943MT/Year and crop production of 8,913 MT for 6 years due to acquisition of 584.43 ha agricultural land and requisition of 163.1 ha agricultural land, respectively; affecting 54 cultural establishments including school, madrasha, mosque, eidgah, graveyards and Hindu crematory places; Causing significant environmental pollution through noise & vibration specially during construction etc.

Glimpse of the points mentioned above may lead to a negative impression about the project. But there is no chance of considering those negatively. Because Bangladesh Government was aware of these and adequate plan has been taken in this regard as the infrastructure is a must for boosting our economy. It can be mentioned that some measures, to compensate these negative impacts, are considered as per recommended by EIA like –

- Limiting river erosion/siltation waterway by insignificant constriction of waterway opening of the bridge.
- Mitigating drainage congestion through making 6 bridges and 14 culverts on the approach road at Janjira side.
- Preparing and following appropriate specification of construction equipment based on ambient pollution level.
- Replanting of 482,430 suitable local trees (50% wood, 30% fruits, 10% fuel & 10% medicine trees).
- Ensuring fish culture in new borrow pit ponds in the 5 RS areas and no exclusive habitat of any endangered species near the project site.
- Preparing RAP and land-use plan to mitigate affected household, etc.

With these mitigation/enhancement measures, overall impact will be limited. The estimated EMP cost for mitigating the negative impacts and enhance the positive impacts is about USD 7.6 million.

#### **4.2. Rooppur Nuclear Project**

Rooppur Nuclear Project will be an economic development engine of the country. Undoubtedly it may be told that after the completion of this project, our great barrier of development. There are many essential businesses those cannot function properly for uninterrupted electricity, American business that lose about USD 50 billion annually due to power failure<sup>5</sup>.

#### **4.3. Deep Seaports**

One of the major factors that have showed down the pace of economic growth in Bangladesh is the lack of proper transport infrastructure, especially deep seaports. The country has not built a new port since independence in 1971, and badly needs to construct one to meet its growing international trade requirements. Government has attached priority to the upgrading of port facilities, since 15% of the country's GDP is dependent on the export of readymade garment. Bangladesh immediately needs a deep seaport that could effectively handle large number of containers. While the Chittagong port suffers due to excessive traffic, Mongla faces the problem of inadequate rail and road connectivity. It is estimated that the delays caused by traffic congestion can cost Bangladesh an extra US\$15000 per day.

#### **4.4. Mass Rapid Transit**

As per ADB, the project rationale and its linkage to Country/Regional Strategy are:

- Bangladesh is rapidly urbanizing. In 2011, 42 million people, or 28% of the population, lived in urban areas. Though urbanization is still relatively low, population growth in the urban areas has been more than double that of the national population growth rate of 1.1%. If this growth is sustained, the country's urban population will reach 63 million by 2025, or 36% of the total population. Rapid urbanization is placing severe strains on the natural environment and has fueled rapid growth in demand for urban transport.

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<sup>5</sup>. 7 mega projects gaining pace Padma Bridge makes significant progress; Metro rail to complete early; 2 more schemes included in fast-track list; Sharier Khan, Hasan Jahid Tusher and Partha Pratim Bhattacharjee; The Daily Star; May 14, 2016.

- The population of greater Dhaka was about 14.4 million in 2013 and is expected to grow to around 25 million in 2025. The population density of 19500 people/km is amongst the highest in metropolitan areas in Asia or Europe, compared with e.g.1 Metro Manila (18500), Tokyo City (16000), Singapore (7600), Hong Kong (6500) or Greater London (5680). As of 2005, only 18% of trips were done by car, while 34% were done by bus and 36% by rickshaws. Currently, there are only 30 cars per 1000 inhabitants, although ownership is rapidly rising amongst the growing middle-class, and cars are producing 70% of the pollution in Dhaka.
- The development of urban infrastructure has not kept pace with rapid urbanization, causing acute shortages of urban services. The road network is underdeveloped and has insufficient capacity to meet growing traffic volume arising mostly from the increasing motorization rate. Poor traffic management, lack of transport demand management, weak public transport services, and the absence of a strategic vision for - land use planning integrated with urban development and transport planning and effective coordination among the transport and urban development agencies cause massive traffic jams, which add to pollution, high transport and logistics costs and limit access to economic opportunities and social services.

The impact will be economic activities, the environment, and health of residents of Dhaka improved. The outcome will be improved efficiency of the public transport system in Dhaka. The outputs will be - metro infrastructure constructed and commissioned and project implementation capacity strengthened.

While in the short term the construction of MRT-Line 6 financed by JICA and BRT-Line 3 (North), financed by ADB will be completed, more high-capacity urban transport is required in the medium and long-term to keep pace with the rapidly growing demand for transport services in Dhaka.

In an interview, published in the Daily Star on 17 January 2017 and captioned 'Happy and rich Bangladesh is the dream' our Finance Minister said, "Bangladesh's economic growth rate should never fall below 7 percent, at least for the next five years. The target to reach 8 percent GDP growth will surely be achieved. We have fixed it conservatively. A great change is that some kind of peace has been restored in the country. .... So I am feeling very good. In the latter part of my life, the Bangladesh that I had dreamt of in the 60s and early 70s is going to be materialized. The prime minister concludes all of her speeches with

the phrase ‘Happy and Rich Bangladesh’ and I clap louder.” The clap will be louder indeed, if, these mega projects are implemented properly.

### **5. Recommendations**

In spite of facing technical and resource constrains, the government seeks greater foreign investment to improve the country’s infrastructure. For greater interest of the country as well as to achieve the goals of Vision-2021 and 2041 government should go ahead for completing these infrastructure and Mega Projects.

For the greater interest of the country, all the agencies relevant to implement of these projects must perform their duties and responsibilities maintaining all ethical standards and code of conducts.

Undoubtedly, these projects will ensure sustainability of our economic growth, human well-being and the achievement of a sustainable future. These steps will be a milestone of the intellectual history of our nation.



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## Climate Change, Agricultural Transformation and Food Security in Northern Bangladesh

MD. TANJIL HOSSAIN\*

A.N.K NOMAN\*\*

**Abstract:** *Bangladesh is an agro-based country. Agriculture plays an important role to the economic growth and economic development in Bangladesh. Climate is a major factor that influence agriculture sector performance. This paper examines the impact of climatic factor in agricultural transformation and food security in Northern Bangladesh. To serve this purpose, primary and secondary data have been collected from two upazila of Rajshahi district. These two upazilas are Godagari and Puthia. Initial survey was made to select the study areas. Based on the initial survey finding. These two upazilas have been selected based on the degree of transformation. Climate is defined by rainfall and temperature and agricultural transformation is measured by the share of guava and mango in total cultivable land in the study area. Food security is defined by food availability or production of food. It is seen that rice cultivation land is transformed into guava and mango orchard. As a result, rice cultivation is reduced that will reduce food production. In addition to this, guava and mango will satisfy the nutritional demand of the population. It is observed that rate of transformation of guava is higher in Godagari than Puthia and rate of transformation of mango is higher in Puthia than in Godagari. The preliminary findings suggest that transformation is going to affect the food security situations both positively and negatively.*

**Key Words:** *Climate Change, Agricultural Transformation, Food Security.*

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\* Assistant Professor, Department of Economics, Jatiya Kabi Kazi Nazrul Islam University, Trishal, Mymensingh

\*\* Professor, Department of Economics, University of Rajshahi

## **1. Introduction and background information**

Bangladesh economy has been growing over the last three decades. Among the three subsectors of economy, agriculture play an important role to generate employment for its population by increasing productivity and growth. The agricultural sector contributes a lot to the countries GDP, Provide employment for nearly half of the labour force and supplies raw materials.

Bangladesh is a country with a population of almost 160 million (BER, 2016) increasing at a rate of 1.3 percent adding about 2 million labour force every year. Agriculture alone provide 45 percent of total national employment. If we only consider the rural economy, agriculture alone provides employment for more than 70 percent of the rural labour force. Rice is the main crop as well as the staple food of the country and the demand for rice is rising in Bangladesh to its population. The cultivable land is shrinking.

Furthermore, Climate is an important determinant of agriculture. Climate change can influence over the crop, livestock and poultry, fisheries and forestry. Crop is directly affected by the climatic factors such as temperature and rainfall and the frequency of other events such as flood, cyclones and drought. Climate change refers to any changes in major climatic variables over a long time. This change may occur because of natural variability and human activities. Climate variability refers to temporal variation about the mean.

Climate change may also change the types, frequency and intensities of various crops and availability of irrigation water supply. An agricultural system is dynamic because producer and consumers are responding to crop yields, food prices, input prices, resource availability, and technological change. Although this is difficult to estimate these, it is necessary to measure accurate climate change impacts. Failure to estimate this may overestimate the damage of climate change and may underestimate the benefits of climate change.

Moreover, transformation of paddy land to mango and guava orchard is the most important factor that influence over food production. Recently, Northern part of the country is witnessing a rapid transformation within agricultural sector that is transformation of paddy field into guava and mango orchard. This region is historically food surplus area and one of the biggest contributors to national food supply. This transformation of agricultural land to others uses will have a negative impact on total rice production.

During the last decades, scientists studied that greenhouse gas and carbon dioxide (CO<sub>2</sub>) would produce global warming and other significant climate change.

Global warming has been increasing since the 1980s. Earth average surface temperature has increased by about 1.2 to 1.4 degree F in the last 100 years.

Food security is a situation where people have no fear of starvation. One of the major concerns of successive government of Bangladesh is the production, distribution and availability of essential food. The food inflation is about 13% (Bangladesh Economic Review, 2011) in Bangladesh. It is also define a situation in which all people at all time will have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for active and healthy life (World Food Summit, 1996). Food security consists of three important components which are food availability, food accessibility and utilization

## **2. Review of Previous Studies**

Hartarska et al shows that annual temperature significantly decreases agricultural production while more rainfall increases production using the simulation model. If climate change negatively affects an agricultural production a crop yield will decline. Consequently price of agricultural product will increase and it may cause malnutrition for poor.

Noman and Ali (2014) shows that agricultural transformation causes due to economic and environmental factors. Environmental factors such as fall in rainfall, rise in temperature, and fall in ground water level are the major reasons for agricultural transformation. This transformation shifting crop land to mango orchard which reduces the cultivable land and reduce food production. This will worsen the national vulnerable food security. If this process of transformation is continued North-Western region will be shifted from food surplus to food deficit region. so, government comprehensive policy is required to address the issue.

A. K. Enam and R, Salim, 2005 shows that Bangladesh become dependent on import of food and increase of international price of food increases the price of food in the domestic market this increases the sufferings of the household of Bangladesh. But there is a lack of modern technique in their paper. Their research paper should use sophisticated econometric technique to make the research up to date.

Rahman and Khan, 2005, show that availability of food is an important element of food security. Food availability is a function of food production, food import and food aid. Domestic production is a major concern of a government. The major problem of increase of production of food is inefficient water supply and

fertilizer decrease of the quality of soil productivity. Investment in agriculture has been reduced from 14% in 1976-81 to 4.5 % in 2000 and 2001. Donor funding has also reduced. Development project related to food security do not implement properly.

J. Shafikuzzaman and A. N. K. Noman (2011) shows that the transformation of paddy field to mango orchard is witnessed in the Northern Bangladesh. The Northern Bangladesh is the major contributor to the National food supply. The transformation of agricultural land to other play negative role to the National food supply. Since half of the population are involved with the agriculture. The reduction of food production will reduce the income of the agricultural labourer. This transformation of agriculture will deteriorate the poverty situation in Bangladesh.

Noman and Julfikar (2014) shows that climatic factors are responsible for agricultural transformation. They conducted this study in Nawabgong sadar upazila. They used some variables such as variability of rainfall, transformation is defined as ratio of mango orchard to total cultivable area and food security. One of the important drawbacks is that this study is conducted based on only one upazila.

### **3. Objectives of the Study**

- ii) Investigate the nature, causes, and types of transformation of agriculture
- ii) To estimate the consequences of transformation on food security

### **Methodology and data**

To achieve the above mention objectives a field survey was conducted during January-February 2017. To find out personal opinions on different issues related to the objectives of the study, farmers were interviewed. A total number of 70 such individual interviews were conducted. The collected data were tabulated and analyzed with the help of simple statistical techniques. A cost-benefit analysis was also done to identify the true causes and nature of transformation.

In this study, the relevant micro level data are collected from Upazilla Agricultural Office and also directly from the farmers to identify the nature, causes and impact of transformation. The data are related both with climatic variable as well as economic variable.

The net return from guava and mango orchard is very high in comparison to that of crop production. Crop production depends on environment. The risk factor for

crop production is also higher. So, the land owners and farmers are rapidly transforming their land from cereal production to mango orchard. As a consequence, cultivable land is shrinking fast and posing a threat to food security. Food security is defined in terms of food production and food availability.

Among the 16 Upazila of Rajshahi, Puthia and Godagari where intensity of transformation is higher are taken under investigation. In this study, important variables are revenue, crop compositions, production structure, productivity, temperature and rainfall. As part of the study some of the findings are presented in this article. Time series analysis will be conducted using net revenue of Aus, Aman and Boro, average rainfall, maximum temperature and minimum temperature

### **Basic Facts of Study Area**

#### **Climate**

The study area bears a moderate and pleasant climate. The temperature, humidity and coldness of the study area are not high. The summer season commences from April and continues up to the end of June. The rainy season comes at the end of June and stays up to September. The winter season starts from the middle of November and lasts up to the end of February. The minimum and maximum mean temperature, vary from 25.5<sup>0</sup>c to 38.7<sup>0</sup> c. The rainfall is heavy during July to September. The annual rainfall of the district recorded in 2011 was 1862 millimeters. The level of humidity was about 77 % in April and about 88 % in July.

#### **Area**

Godagari is the largest with an area of 472.13 sq km (182.24 sq mile) which is 19.61% of total area of the zila. Puthia is 192.64 km which is 8 percent of zila.

#### **Population**

According to population Census 2011, total number of household was 72186 and population was 3, 30,924 in Godagari. and the household and population are 52922 and 2,07,490 respectively in Puthia.

#### **The economic situation**

The economy of the study area is predominantly agricultural. Out of total holdings of the district, almost 56% holdings are farms that produce varieties of crops,

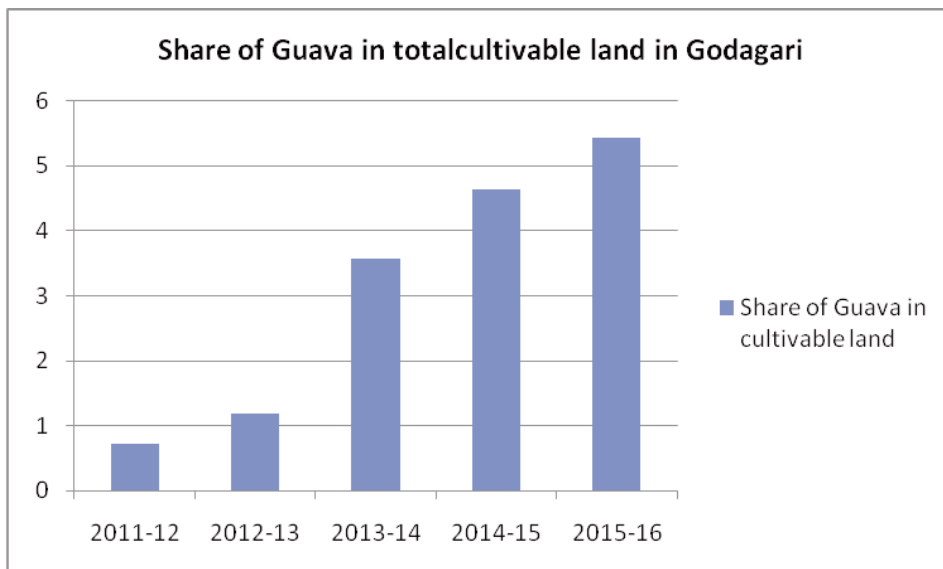
namely local and HYV paddy, wheat, potato, pulses and other minor cereals. Various fruits like mango, guava, banana, coconut etc are grown in the districts.

### Basic Facts of Godagari Upazila

#### Guava farming in Godagari Upazila

The godagari upazila is witnessing a rapid transformation in the agricultural sector. In 11-12, about 0.71 % of total cultivable land was under guava farming. In 2015-16, about 5.42 of cultivable land has been under mango farming. The guava farming is five times higher than initial situation. The present status of the guava farming is shown in the diagram given below.

Figure 1: Share of Guava in total cultivable land in Godagari



#### Mango farming in Godagari Upazila

In 11-12, about 0.82 % of total cultivable land was under mango farming. In 2015-16, about 1.53 of cultivable land has been under mango farming. The rate of transformation of mango farming is lower than the guava farming in Godagari upazila. The present status of the mango farming is shown in the diagram given below. The mango farming is double than the initial farming

Figure 3 shows that the share of boro in total cultivable land is about 50 percent in 2009-10. This is reduced to 40 % in 2012-13. This is stable up to 2015-16.



Figure 2: Share of Mango in total cultivable land in Godagari

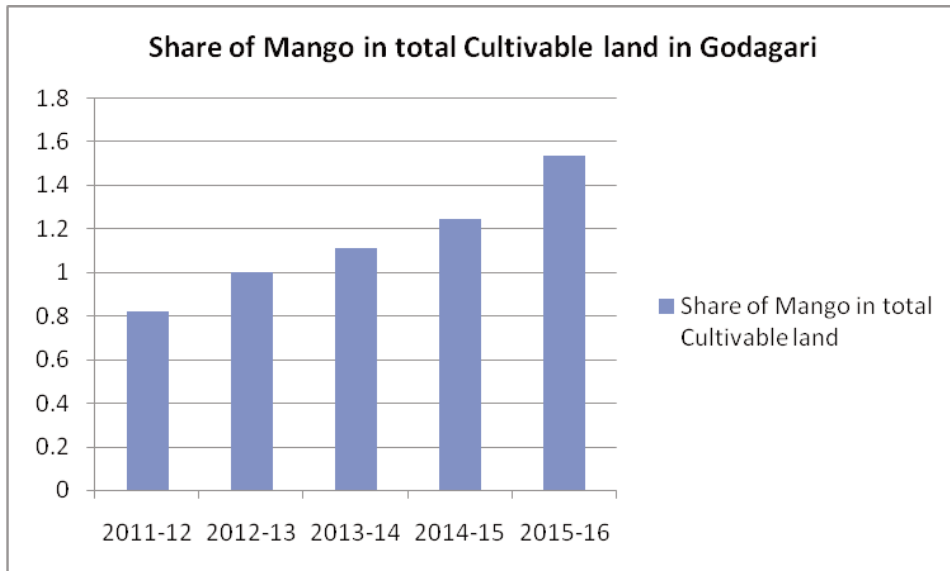
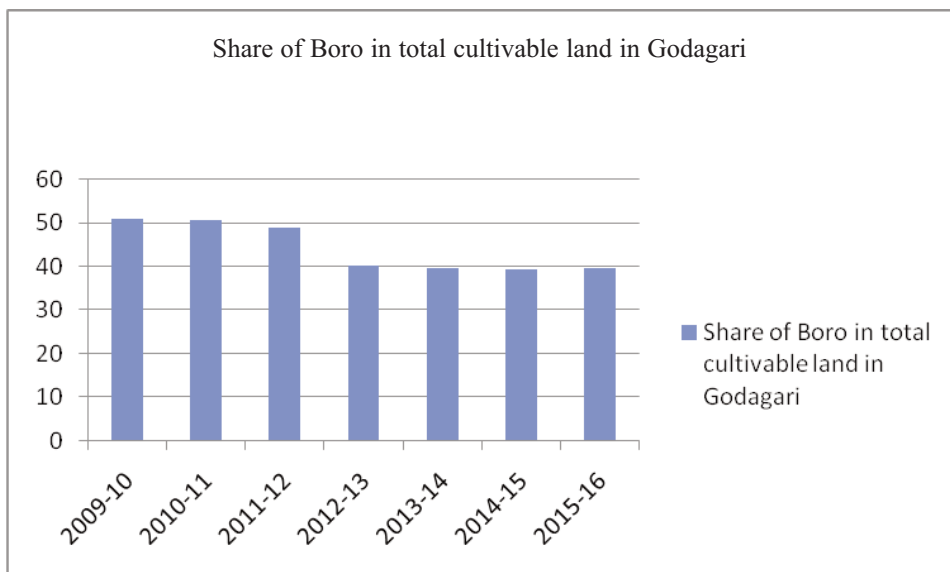


Figure 3: Share of Boro in total cultivable land in Godagari



So, it is clear from the figures that the share of orchard in total cultivable land increases and cultivable land of rice reduces. This will reduce production of paddy that is a threat to food security.

*Table 1 : Total area and production of different rice crop from 2009-10- 2015-16 in Godagari*

Year	Aus		Aman		Boro	
	Area (Hectare)	Production ( MT)	Area ( Hectare)	Production ( MT)	Area (Hectare)	Production ( MT)
2009-10	11725	30485	29000	76555	19200	65803
2010-11	11850	30731	28750	76634	19055	72440
2011-12	12658	27278	28735	75093	18365	71497
2012-13	10630	27866	24411	77626	15150	54175
2013-14	11443	12225	23700	21095	14950	52312
2014-15	12225	31785	26650	84120	14750	56050
2015-16	12370	32327	26630	84417	14950	61295

Table-2 shows that cultivable area of Guava was 270 hectare in 2011-12. This increased to 2050 hectare in 2015-16. It is also seen that share of Guava in total cultivable land was 0.71 percent in 2011-12. This increased to 5.12 percent. This indicates that production of Guava increased. The cultivable land of Mango was 310 hectare in 2011-12 . This increased to 580 hectare in 2015-16. This indicates that share of mango in total cultivable land is increasing over the years.

*Table 4 : Total Cultivable land in Godagari*

Types of Crop Land	Area ( hacter )	%
Single Crop	5100	12.90
Double Crop	20742	52.49
Tripple Crop	13683	34.63
Total	39510	100

Source: Upazila Agricultural Office, Godagari

### **Fall in Production in rice in Godagari**

Table 4 shows that the cropping intensity in Godagari shows that about 13 percent of total arable land is single cropped, about 53 percent is doubled cropped and the

*Table 5 :Production and Demand of food in Godagari*

Description of Item	Total (MT)
Demand for food	62780
Production of food	214114
Surplus of food grain	151334

Source : Upazila Agricultural Office, (UAO ), Godagari ( 2016-17)

rest is triple cropped. Under the present circumstance, Godagari is surplus of food. Under the present rate of transformation of rice field to guava and mango orchard, within 10 years about 20 percent of total arable land will be transformed to guava and mango orchard. As a consequences, there will be a fall in rice production.

*Table 8 : Revenue from Guava, Mango and Aus, Aman and Boro*

Age of Guava orchard	Production Mound	Revenue (Per hacter)	Cost ( Per hacter)	Return ( Per hacter)
2-3 years	561.75	831390	501830	329560
Field Survey, 2017				
Age of Mango Orchard	Production (Mound)	Revenue ( Per hacter)	Cost (Per hacter)	Return (Per hacter)
10-15 years	262.15	324878	69746	254188
Field Survey,2017				
Kinds of Paddy	Production (Mound) Per hacter	Revenue (Per hacter)	Cost (Per hacter)	Return (Per hacter)
Aman	118.5	78645	63665	11235
Boro	142.31	98545	63342	38625
Field Survey,2017				

The finding from the field survey shows that economic factor is the most important factor which influencing over the rapid transformation of the rice area into mango and guava orchard. Calculations of the return of the above table show that mango and guava orchard more profitable than rice cultivation.

*Table 9: Monthly Rainfall in Puthia Upazila from 2012 – 2016 (Millimeter)*

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2012	-	-	6	90	26	103	131	76	135	96	66	-	729
2013	5	17	12	25	110	204	132	206	226	197	-	-	1134
<b>2014</b>	00	35	09	55	166	292	256	324	321	17	00	00	1475
2015	05	18	25	146	175	395	348	274	187	39	11	03	1626
2016	36	00	17	20	195	25	411	11.3					293

Source: Upazila Agricultural Office, UAO

### **Basic Facts of Puthia Upazila**

Monthly rainfall, total rainfall are presented in the above table. The findings shows that the highest rainfall is during the time between May and September. The rainfall is low between the month November and February. It is observed that the highest amount of rainfall was in 2015.

Table-10: Total area and production of different rice crop from 2009-10 to 2015-16 in Puthia

Year	Aus		Aman		Boro	
	Area (hectare)	Production (MT)	Area (hectare)	Production (MT)	Area (hectare)	Production (MT)
2009-10	100	225	4890	16953	4630	32837
2010-11	90	219	4500	21600	3550	12365
2011-12	90	286	4600	22080	3100	11160
2012-13	110	286	4600	22080	3535	17115
2013-14	150	383	3100	10198	2650	12112
2014-15	141	338	3350	10699	2730	11820
2015-16	90	216	4100	13104	2735	18300

Source: Upazila Agricultural Office (UAO), Puthia

Table-6: This table shows that cultivable land of boro reduced significantly. This also shows that share of boro in total cultivable land reduced from 30 percent to 19 percent in Puthia. It is also seen that the share of guava in total cultivable land increased. In addition to this share of mango in total cultivable land increases. This indicates that there is a transition of paddy to guava and mango. It is seen that share of boro in total cultivable land reduced but share of mango and guava in total cultivable land increased significantly. So, there is a clear transition of agricultural crop from boro to mango and guava in Puthia

Figure 5: Share of Guava in total cultivable land in Puthia

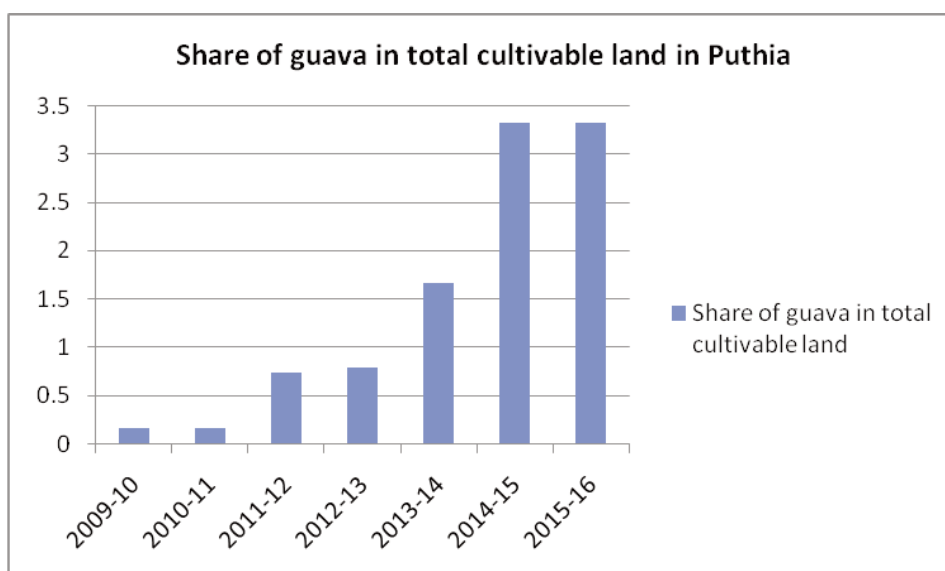
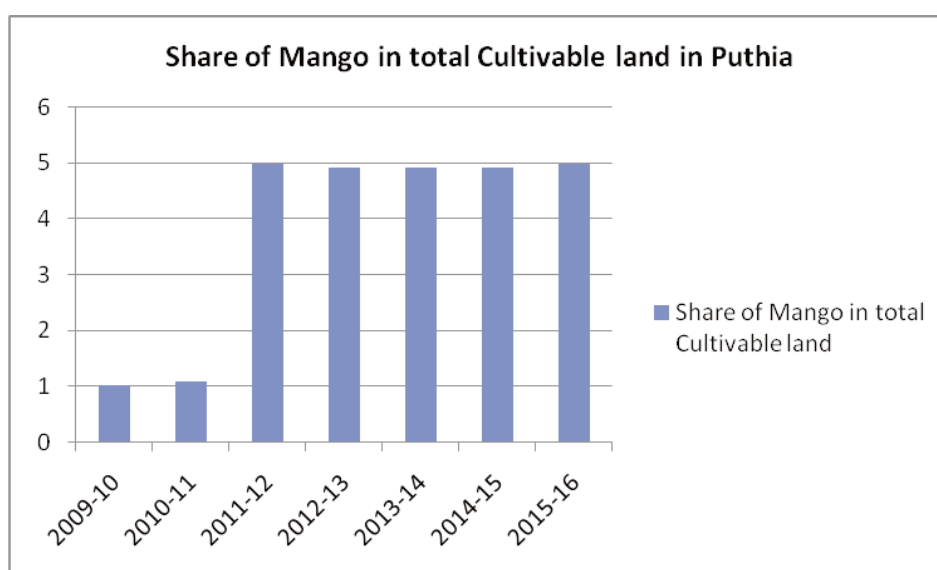


Table-7 shows that share of guava in total cultivable land increased from 0.15 to 3.32 %. This indicates that guava production increased in more than two times. It is also indicated that share of mango in total cultivable land in Puthia increased significantly.

Figure 6 : Share of Mango in total cultivable land in Puthia



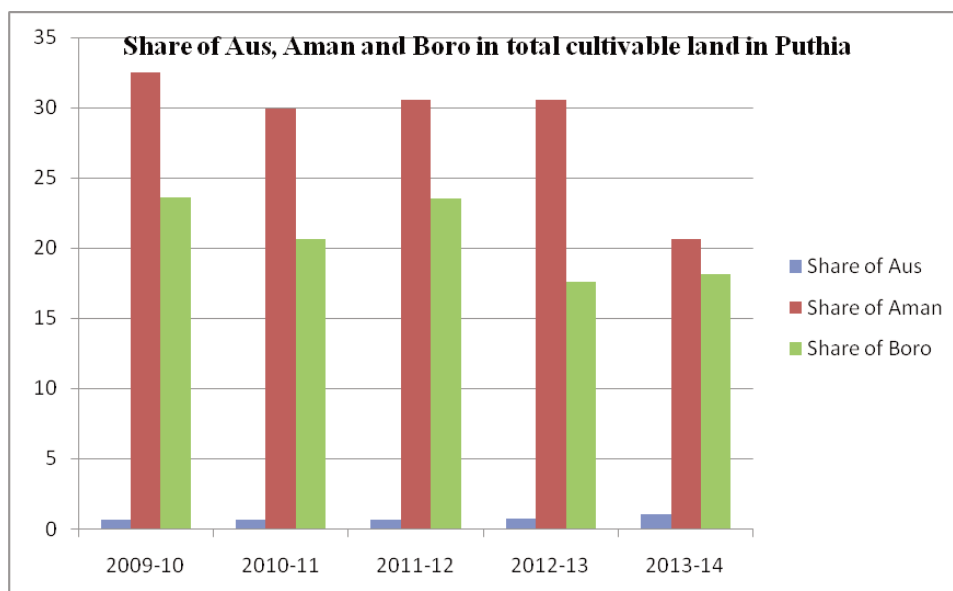
**Guava Farming in Puthia Upazila:** In 2009-10 about 0.15 % of total cultivable land was under guava farming. In 2015-16, about 3.32 percent of cultivable land has been under guava farming. The guava farming is four times higher than 2009-10.

**Mango farming in Puthia Upazila:** In 2009-10, about 1.01 percent of total cultivable land was under mango farming. In 2015-16 about 4.98 percent of cultivable land has been under mango farming. The mango farming is five times higher than 2009-10.

### Fall in Production in Rice

The above table shows that the cropping intensity in Puthia shows that about 7 percent of total arable land is single cropped, about 82 percent is doubled cropped and the rest is triple cropped. Under the present circumstance, Puthia is surplus of food. Under the present rate of transformation of rice field to guava and mango orchard. About 20 percent of total arable land will be transformed to guava and

Figure 7: Share of Aus, Aman and Boro in total cultivable land in Puthia



mango orchard. As a consequence, there will be fall of rice production. This is a threat to food security in Bangladesh.

Table 13: Total Cultivable land in Puthia

Types of Crop Land	Area ( hacter )	%
Single Crop	854	7.22
Double Crop	9708	82
Tripple Crop	1263	10.68
Total	11825	100

Upazila Agricultural Office, Puthia

The finding from the field survey shows that economic factor is the most important factor which influencing the rapid transformation of the rice area into mango and guava orchard, calculations of the return of the above table shows that mango and guava orchard more profitable than rice cultivation.

In this diagram it is seen that, share of guava in total cultivable land in godagari is higher than the share of guava in total cultivable land in puthia . That is the land quality is favourable for guava in godagari than puthia.

In this diagram, it is seen that share of mango in total cultivable land is higher in Puthia than share of mango in total cultivable land in Godagari. It is observe that

Table 14: Production and Demand of food in Puthia

Description of Item	Total ( MT)
Demand for Food	119326
Production of Food	150010
Surplus of Food Grain	30684

Source: Upazila Agricultural Office, Puthia ( 2015-16)

Table 8 : Revenue from Guava, Mango and Aus, Aman and Boro in Puthia

Age of Guava orchard	Production Mound	Revenue (Per hacter)	Cost ( Per hacter)	Return ( Per hacter)
2-3 years	1258	1887480	1123500	763980
Field Survey, 2017				
Age of Mango Orchard	Production (Mound)	Revenue ( Per hacter)	Cost (Per hacter)	Return (Per hacter)
10-15 years	269.64	539280	1675776	372702
Field Survey,2017				
Kinds of Paddy	Production (Mound) Per hacter	Revenue (Per hacter)	Cost (Per hacter)	Return (Per hacter)
Aman	119.84	95872	66600	29181
Boro	191.74	122236	87558	38423
Aus	87.88	66810	60189	6621
Field Survey,2017				

land of Barendra region of Godagari is not favourable for mango cultivation. It is observed that after 6-7 years of mango cultivation many farmers cut mango orchard due to lack of growth of mango tree. In addition to this taste of mango of Barendra region in Godagari is not good. But the land quality of Puthia is favourable for mango cultivation. The growth of mango tree is high and the taste of mango is good. So the transformation rate of mango orchard is higher in Puthia than Godagari.

### Conclusion

The data shows that a significant amount of cultivation land has been transformed permanently into guava and mango orchard. The consequence of transformation has already been felt in terms of rice production. Similar findings were obtained from sadar Upazila Nawabgong ( Noman and Julfiqar, 2014 ) . The degree of transformation from rice field to guava orchard is higher in Godagari than that of Puthia. The degree of transformation from rice field to mango orchard is higher in

Figure 4 : Comparative analysis of guava farming in Godagari and Puthia Upazila

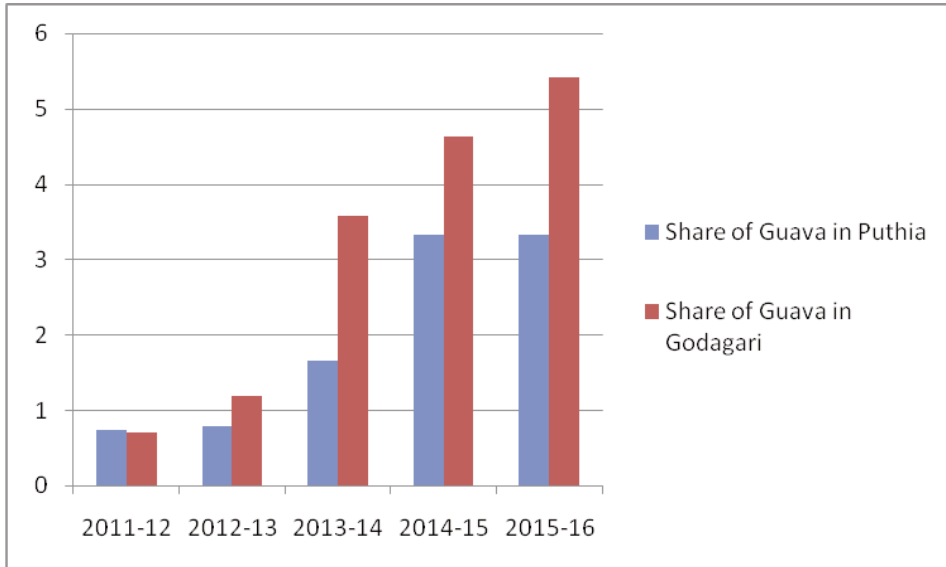
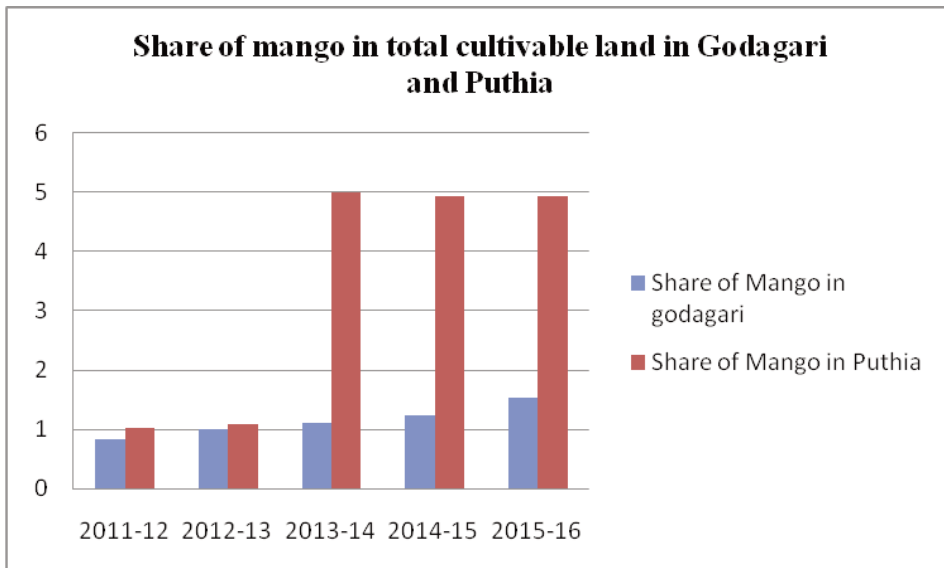


Figure 5 : Comparative analysis of Mango farming in Godagari and Puthia Upazila





Puthia than that of Godagari. Both of these areas are surplus crop producing areas and significant contributors to national food supply. It is seen that the production of the major crops in both of the areas declines. If the process of transformation continues in this manner, there is a very high possibility that these areas will not produce surplus crop. This will pose a threat to national food security.

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## A Comparative Study on Rickshaw Fare and Rickshaw Pullers' Income between Trishal and Mymensingh Municipality

MD. ALTAP HOSSEN\*

AKLIMA KHATUN\*\*

**Abstract :** *The paper examines differentiation of fare and income of Rickshaw pullers between Trishal and Mymensingh municipality. Data from both municipalities were used to achieve the objective of the study. An ANOVA model is estimated to measure the differentiation of fare and income. The findings show that the income of rickshaw puller of Trishal is differentiated significantly (about BDT120 lower per day) just for pulling rickshaw in Trishal although per Km. fare is higher (about BDT5) than that of Mymensingh.*

**Keywords:** Fare, Income, Rickshaw, Mymensingh, Auto-rickshaw and Trishal.

### 1. Background of the study

The rickshaws are one of the most important modes of transport in Bangladesh. They constitute one-third of the total value added in the transport sector (Rob Gallagher). It is a man driven labour oriented vehicle. It provides transport services for goods and passengers on small scale for short distance without the use of fuel, any kind of natural gas, diesel and petroleum (Julfiker and Mamun, 2010). It provides a means of subsistence for groups of people for whom there is quite literally no alternative (Whitelegg et. al 2003:160).

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\* Assistant Secretary (Planning and Research), The Federation of Bangladesh Chambers of Commerce and Industry (FBCCI), E-mail: altap.fbcci@gmail.com

\*\* Lecturer, Department of Economics, Dhaka State College, Dhaka.

## **2. Objectives and scope of the study**

The main objective of the study is to analyze the economic causes of the rickshaw fare's differences between Trishal and Mymensingh.

### **2.1 Rationale of the study**

According to the free market economy, the Rickshaw fare between two places will be the same over time. There is a common saying that the Rickshaw fare in Trishal municipality is higher as compared to other nearest municipality. The rationale of the paper is to judge the above statement as compared to Mymensingh municipality.

## **3. Literature Review**

Rob Gallagher (1992) showed that rickshaws contributed 34% of the total value-added by the transport sector to the GDP of Bangladesh and directly supported 4.5% of the country's total population. He estimates more than 75% of rickshaws in Bangladesh are found in urban areas.

Shafia Begum and Binayak sen (2005) analyzed the dynamic effects of the labor intensity. It helps to understand the actual pro-pooriness of a growth process. They are designing a better policy environment for the poor.

Mohammad Mamun, Morshed Bhuyan and Kazi Julfikar Ali (2010) found negative impact on income of rickshaw puller for introducing mini-bus services. They suggest ensuring better environment for the rickshaw pullers as a comprehensive social development.

Abu Sayem Mohammad Hasan (2013) found that both the income and the expenditure rise over time for establishing university. He showed that the university has positive impact on the standard of living of rickshaw pullers.

All of the above emphasizes on more research and development activities.

## **4. Limitations of the study**

Though the authors tried their best to bring in perfection but the study suffers from the limitations. The respondents are limited in terms of size and composition which may fail to represent the actual scenario. Moreover, due to lack of adequate textbook and previous study both in Trishal and Mymensingh Municipality, literature review could not be extensive.

## 5. Hypotheses of the study

The main purpose of hypotheses building is to test whether there is a fare and income differentiation in the two studied area. On the basis of fitted regression model following hypothesis is considered to test.

**Null hypothesis  $H_0$ :** There is no fare and income differentiation between Trishal and Mymensingh,  $\beta=0$

**Alternative hypothesis  $H_1$ :** There is fare and income differentiation between Trishal and Mymensingh,  $\beta \neq 0$

We will test this hypothesis using the usual t-test. We find that estimated  $\beta$  is statistically significant then the result will indicate that the mean fare and mean income of two municipalities are different. Thus, it will prove that there is a fare and income differentiation between Trishal and Mymensingh.

## 6. Methodology

To explain this study, we use both qualitative and quantitative method. The methodology is the admixture of the theoretical and econometrical in nature. This empirical study used survey data and applied analysis of variance (ANOVA) model to find the fare differentiation and income between Trishal and Mymensingh municipality.

### 6.1 The Data

It involves collection of information from individual rickshaw puller from each area. Data were collected by the authors themselves. A structured interview schedule was used for collection of data during April to May in 2015. 100 rickshaw pullers were taken into consideration. Out of total 100 samples 50 were from Mymensingh and 50 were from Trishal. For all the samples, simple random sampling technique was used. All the collected information were accumulated and analyzed by Statistical Package on Social Science (SPSS) and then presented in textual and tabular forms to understand the present status of the fare and income of the studied area.

### 6.2 Analysis of Variance (ANOVA) Model

To show the fare and income differentiation, we will estimate the following ANOVA model:

$$Y = \alpha + \beta D_1 + u_j \quad (\text{D.N. Gujarati})$$

Where,

$Y$  = Daily income of Rickshaw pullers

$D_i = 1$ , if Rickshaw puller is in Mymensingh

$D_i = 0$ , if Rickshaw puller is in Trishal

$u_i$  = Disturbance term

The model may enable us to find out whether place makes any differences in daily income of Rickshaw pulling.

### 6.3 Assumption of the model

All the other variables rather than fare and income are held constant.

### 6.4 Expected findings of the model

If the above assumptions are satisfied then we will form the model as-

Mean daily income of Rickshaw puller in Triahal,  $E(Y/D_i=0) = \alpha$

Mean daily income of Rickshaw puller in Mymensingh,  $E(Y/D_i=1) = \alpha + \beta$

That is the intercept term  $\alpha$  gives the mean income of Rickshaw puller in Trishal and the slope co-efficient  $\beta$  tells by how much the mean income of Rickshaw puller in Mymensingh different from the mean income of Rickshaw in Trishal,  $\alpha + \beta$  reflecting the mean income of Rickshaw puller in Mymensingh.

### 6.5 Hypothesis of the model

Null hypothesis,  $H_0 = \beta_1 = \beta_2 = 0$

Alternative hypothesis,  $H_1 =$  Not all slope coefficients are simultaneously zero

## 7. Results and discussion

Estimation of the Analysis of Variance (ANOVA) model

The result corresponding to the regression of ANOVA model is follows:

*Table: Estimated results of the ANOVA model*

Variables	Co-efficient	T-values	Significance value (P)	Standard Deviation	F	Significance of F value	$R^2$
Constant	349.00	56.814	.000	43.437		.000	0.555
Respondent place	120.00	50.129	.000	66.155	2.513E3		

*Source: Based on Field Survey 2015.*

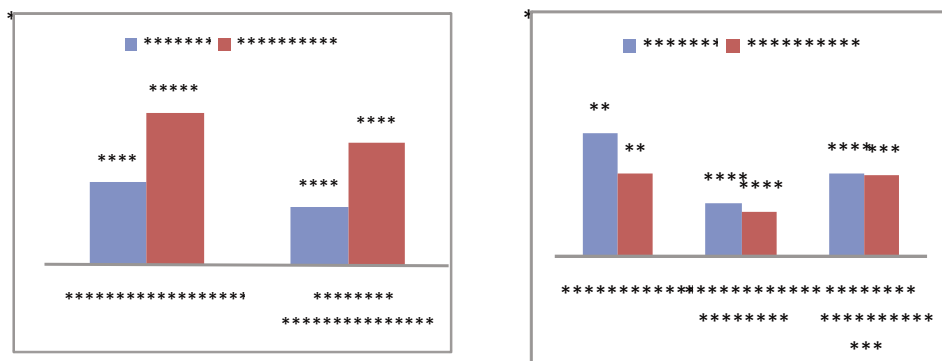
As these estimated results of the ANOVA model show, the estimated mean daily income of Rickshaw puller in Trishal is BDT 349 (= estimated  $\alpha$ ) and that of Rickshaw puller in Mymensingh is BDT 469 (= estimated  $\alpha+\beta$ ).

Since estimated  $\beta$  is statistically significant both at 5% and 10% level of significance, the results indicate that the mean daily income of Rickshaw puller of Trishal and Mymensingh are different. Actually, average income of rickshaw puller in Trishal is lower than that of richshaw puller in Mymensingh by BDT 120 (= estimated  $\beta$ ). Following the assumptions of the model, it may be said that there is fare and income differentiation between Trishal and Mymensingh.

### 8. Findings

In our study, we have found the following mean comparisons:

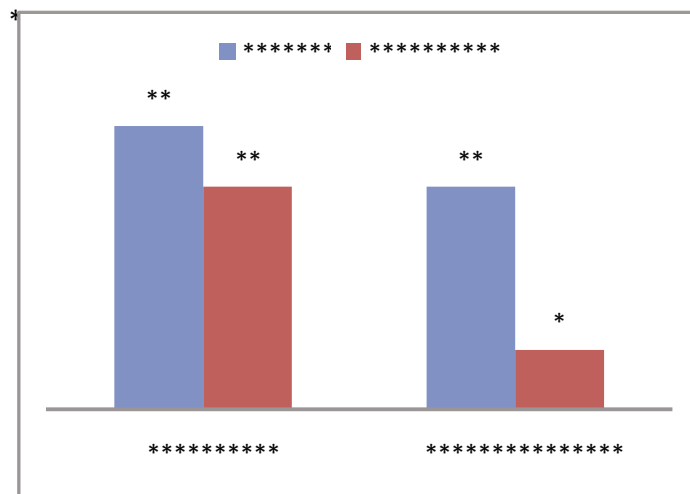
Figure: Mean comparisons among variables



From the above histogram, we come to know that fare per Km in Trishal is BDT 15 while it is BDT 10 in Mymensingh that represents that fare in Trishal is 25% higher than that of Mymensingh. The monthly mean income of Mymensingh is BDT 10,210 while it is BDT 9,430 in Trishal. It shows that monthly income of Mymensingh's rickshaw pullers is 8.27% higher than that of Trishal. Otherwise, monthly mean expenditure of Mymensingh is BDT 9,862 while it is BDT 9,150 in Trishal. It shows that the monthly expenditure of the rickshaw pullers of Mymensingh is 8.27% higher than that of Trishal. The higher percentage of income (8.27%) will be abolished by expending at a higher rate (7.79%) in Mymensingh. Thus, it shows that the advantages of pulling rickshaw in Mymensingh are not higher than that of Trishal. Now, both are same in real income level.

The figure also shows that rickshaw pulling in Mymensingh is difficult than that of Trishal as Mymensing's rickshaw pullers give more trip in a day. As a result, rickshaw pullers of Mymensingh are kept about 1.52 days per week as leisure while it is about 0.52 in Trishal. The leisure is required to re-energize for further rickshaw pulling.

Figure: Mean comparison



The above savings graph tells us savings in Mymensingh is 22% while it is 28% in Trishal. The saving rate is 6% higher in Trishal than that of Mymensingh. It represents the better economic condition of rickshaw pullers in Trishal.

In our above discussion, the fare rate and daily income shows the contradictory picture (higher fare rate -lower income in Trishal and lower fare rate-higher income in Mymensingh).

From the economic terminology we came to know that lower price (fare rate) increases the total revenue. It is true for the Mymensingh but not for the Trishal pourshava.

However, the contradictory outcome may be occurred for the following reasons:

- **Daily income level:** Daily income level of rickshaw pullers in Trishal is lower as compared to Mymensingh. So, rickshaw pullers of Trishal are charged higher fare.
- **Number of trip:** The rickshaw pullers of Trishal have lower trip than that of Mymensingh because Trishal is a less crowded municipality. Thus, rickshaw pullers of Trishal charged hire fare to meet up their livelihood.



- **Supply of rickshaws:** Supply of rickshaw is lower in Trishal as compared to Mymensingh (Total number of licensed rickshaws in Mymensingh is 12,204 and we have not found the exact number in Trishal) (Source: *Municipal Office and Labour Union*).
- **Condition of road:** Most of the roads in Trishal are bad as compared to Mymensingh. So, they cannot carry passengers properly and timely. Thus, they want higher amount of fare.
- **Substitutive form of rickshaws:** There is dynamic substitutive form of rickshaws in Mymensingh as compared to Trishal. As a result, rickshaw puller charged higher amount of fare.
- **Establishment of Nazrul University:** Our study found that before establishing the University the fare rate in Trishal is slightly lower than Mymensingh. For the establishment of the university, there is created huge excess demand. Because Trishal is a small pourashva. Thus, rickshaw pullers charged higher amount of fare as demand of rickshaw service is increased.
- On the contrary, Mymensingh is a big municipality. There is no such type of any factor that is caused for sudden huge excess demand. Rather, introduction of modern modes of transportation causes many rickshaw pullers to leave their profession in Mymensingh.
- **Socio economic condition:** Rickshaw pullers in Trishal demand more fare as their economic condition is better as compared to Mymensingh (Land and rickshaw ownership status is higher in Trishal than Mymensingh). Most of the rickshaw pullers in Trishal have consumed own produced rice. Thus, the better economic condition (as compared to Mymensingh) intends them to stay in Trishal. They are pulling rickshaws to meet up extra cost rather grain. Thus, their *reserved* fare is higher. If passengers do not give higher fare they do not provide services. Rickshaw pullers of Trishal have no desire to go outside for rickshaw pulling. Moreover, if they want to go to Mymensingh for higher income then their transportation cost will abolishes their advantage.

## 9. Concluding remarks

Thus the null hypothesis is rejected. So, alternative hypothesis is accepted. There is fare and income differentiation between Trishal and Mymensingh paurashava. This result implies that per Km. fare is about BDT5 higher than that of

Mymensingh. It is the cause of lower supply of rickshaw pullers in Trishal. This result also implies that per day income of Trishal is BDT120 lower than that of Mymensingh. Trishal is a less crowded municipality as compared to Mymensingh municipality. Thus, it has lower trip than that of Mymensingh. However, the study found that the rickshaw pullers' income is reducing day by day. It occurs for lack of passengers and due to the development of modern vehicles (i, e, auto rickshaw). The modern vehicles are easily carrying huge passengers and take little time to communicate.

So, we should save both rickshaws and rickshaw pullers as rickshaw is environment friendly mode of transportation and it generates huge amount of employment. Besides, it is the part of our culture and tradition.

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**Appendix****1. ANOVA  
T-Test***One-Sample Statistics*

	N	Mean	Std. Deviation	Std. Error Mean
Daily Income M	50	469.00	66.155	9.356
Daily Income T	50	349.00	43.437	6.143

*One-Sample Test*

Test Value = 0						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of Difference	
					Lower	Upper
Daily Income M	50.129	49	.000	469.000	450.20	487.80
Daily Income T	56.814	49	.000	349.000	336.66	361.34

## Univariate Analysis of Variance

*Tests of Between-Subjects Effects*

Dependent Variable: Daily Income M						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Corrected Model	.000 <sup>a</sup>	0	.	.	.	
Intercept	1.100E7	1	1.100E7	2.513E3	.000	
Error	214450.000	49	4376.531			
Total	1.121E7	50				
Corrected Total	214450.000	49				

a. R Squared = .000 (Adjusted R Squared = .000)

## Protecting the Circumstances by Green Financing: Possibility of Energy Saving Automated Brickfields in Bangladesh

MD. JULKER NAIM\*  
MD. EZAZUL ISLAM\*\*  
TASLIM AHAMMAD\*\*\*

**Abstract:** *The main objectives of the paper are to present the pollution of circumstances and ways to reduce by green financing. Energy saving automated brickfield making industry is the key concern of this research. Energy saving automated brick technology with the promises to protect the environment against the multidimensional damage done by old brick system. Now-a-days Bangladesh faces a flourish in real estate sector that stimulates the brick industry too, but the very old traditional brick making system destroys the diminishing forest of this country intensifying the emission of carbon in the air polluting environment and end the life and livestock of the country. After presenting such facts regarding old brick system, the paper also examines the potentiality of energy saving automated brick technology with details as well as protecting the circumstances by green financing. Automated process, government support and extreme high demand with income through selling carbon credit are some promises of this energy saving automated brickfield.*

**Keywords:** *Energy Saving Automated Brickfield Technology, Old Brick Making Industry, Securing Environment, Green Financing, Bangladesh.*

\* Assistant Director, Bangladesh Bank, E-mail: julker.naim@bb.org.bd

\*\* General Manager, Bangladesh Bank, E-mail: ezazul.islam@bb.org.bd

\*\*\* Assistant Professor, BSMRSTU, E-mail: taslim.ahammad.hr@gmail.com

## 1. Introduction

Bangladesh can lessen significant amount of carbon emission and conserve its forests and environment through adopting energy efficient clean technology in brick kilns. However, there is hardly any research work on securing environment with special focus on energy saving automated brickfield role in Bangladesh. According to the Air Quality Management Project (AQMP), Bangladesh is rated as having one of the worst air quality in the world, causing an estimated 18,000 premature deaths a year in capital Dhaka alone. Brick kilns around Dhaka are the main reason of this worst air quality. The brick kilns emit toxic fumes containing carbon monoxides and oxides of sulphur (SO<sub>x</sub>) are harmful to eye, lungs and throat. These air pollutants inhibit the mental and physical growth of children as well as the old people and affect crops and plants in the areas nearby to brick fields.

This article aims to present the fact how this endangered environment of Bangladesh can be saved by the mass use of energy saving automated brick technology.

This article is divided into five parts: the 1<sup>st</sup> part contains the research methodology used in this work; in 2<sup>nd</sup> part a discussion on old brick making industry in Bangladesh is provided. In the 3<sup>rd</sup> part, a discussion will be presented on green finance for the energy saving automated brick technology. In the 4<sup>th</sup> part, the paper reviews the possibility of the energy saving automated brick technology in Bangladesh. The final part of the paper concludes with conclusion, research findings, and policy implications.

### Background of the Study

Although only before 1739, the roots of environmental movement can be found, but most modern history does not reflect until our management is sustainable for sustainable management and sustainable management. Just how it seems to lead the situation in our progress environment; Industrial revolution, pollution, cars and smoke, insecticides can continue, and on. In the twentieth century, environmental concerns grew in popularity and recognition, and in the 1950s, 'perfect growth' was responsible for public awareness and encouragement to go '60, 70' and 'green'. It is not safe to say that more people and businessmen recognize the importance of conserving our environment and accepting green practices, it can be said that the movement is not a trap, but mainstream and not safe here to stay here. Between 20 and 25 years ago, there was an alternative to creating environmentally friendly choices rather than the necessary and real life,

rather than the “tree touches” type. Since then, we realized that if we really want to “save the planet”, we should consider the effect which we have directed towards its destruction. Plates are not just for the people to change, so the business around the world is pretty close. In the last decade, people across the board were cut from waste and promoted world-friendly products and services. In a financial sector, a growing trend for the development of deer banking system is a step. Financial institutions recognize their role in a paperless society and work on implementing effective, convenient, less unexpected strategies every day. Online banking, electronic bill pay and e-statement only facilitates online banking information gathering and branch visit - gas. Nevertheless, the company now uses remote capture in the process of testing their business conditions. Remote capture is backing’s future wave, and it’s green-a major bonus.

### **Objectives**

The objective of this paper is to present a) to access out traditional brick system in Bangladesh & b) to access out possibility of environment saving automated brick technology by green financing.

### **Methodology**

The study based on both primary and secondary sources. The facts have been presented after the discussion with colleagues. The primary data were collected through informal conversation with employee working in energy saving automated brick technology. The cost of setting a energy saving automated brick technology kiln and justification of that cost had been the issue of conversation. The secondary data were collected on perusal of the selected available research work, text book, articles, journals, newspaper analysis, related websites and analysis of reported case decisions.

### **Literature review**

**British Institute of Management (BIM) (1992)** urged in favor of greening and launched a major report which produced basic tips on greening the workplace.

**Rutherford Michael (1994)** stated that Banks need to monitor post transaction for the ideal environmental risk management program during the project implementation and operation.

**Schmidhciny S, Federico J, L Zorraquin (1996)** described that commercial banking has been emphasized on investment banking rather environmental risks but it would play a larger role in their investment decision in the near future.

**Jeucken M and Bouma JJ (1999)** mentioned that investment which take into account of environmental side-effects usually have lower rate of return.

**PravakarSahoo, Bibhu Prasad Nayak (2008)** explored the importance of green banking and highlighted important lessons for sustainable banking and development in India.

**Ginvosky, John (2009)** focused on the efforts of community banks in the U.S. to leverage sustainability, or green banking.

**Rahman A (2010)**, governor of the central bank of Bangladesh, focused on green banking.

**Ullah, M. M. (2010)** marked green banking as a component of global initiatives to save the environment and climate. He concluded the study pointing out that state owned commercial banks and social development banks are less concerned with this issue.

**Khan, M.T.A. (2012)** stated that green banking initiatives by all banks are a moral obligation to save the people. He also urged that lenders should consider 'Go green' and 'Think green' themes.

**Millat, K. M. et. al; (2012)** reported that Banks in Bangladesh have enthusiastically responded to Bangladesh Bank's guidance about green banking, with steps in environmentally responsible financing that are beginning to make profound impact on environmental practices in the real economy.

**M. Amiruzzaman, Julker Naim; BBTB (2016)** Green Banking Practices in Bangladesh, An Ingenious Action for Sustainable Development. Climate change is the most complicated issue the world is facing. Across the globe there have been continuous endeavors to measure and mitigate the risk of climate change caused by human activity. Many countries the world over have made commitments necessary to mitigate climate change. Although banks are considered environment friendly and do not impact the environment greatly through their own 'internal' operations, the 'external' impact on the environment through their customers activities is substantial.

Studies generally pointed that banks in Western Europe countries obeyed to the rules and took initiatives to improve their sustainability (they put the three indicators of society, environment and economy almost at same value). The RARE organization study showed that the majority of European banks didn't measure performance related to indirect aspects (customers and financial products) (Vigano, 2006). The conclusion of EIRIS organization (2007) was that OECD-Europe region was most advanced on products and services beneficial to



the environment. The results of the sustainable assessment of six UK banks by Amacanin (2005) indicated that majority of the banks had reached the preventive banking phase in Jeucken's model while only two banks had reached the higher phase of offensive banking. In Spain, it was shown that in the presence of a positive valuation of social responsibility practises by consumers, a firm may obtain a better strategic position, along with higher margin, demand, and profit, and the empirical analysis confirmed that consumers significantly value other features apart from price in making deposit and mortgage decisions, particularly a financial institution's social responsibility (Callado, 2006). Zappi (2007) presented the modular approach given to CSR and the need for integrating CSR into the fundamental strategic orientation of an Italian bank, in order to mainstream CSR into the heart of business theory and practice. In Portugal, a study suggested that legitimacy theory may be an explanation of social responsibility disclosure by banks (Branco, 2006). In Ireland, research has revealed discrepancies in corporate social reporting. The experience of the top five Romanian banks confirms the theoretical assumptions: the highest rated banks, considering their total assets, were also socially and environmentally responsible corporate banks (Cosmin, 2008). The results of the UNEP-FI survey (2006) among financial institutions and stakeholders in Greece have revealed many good approaches regarding.

### **An synopsis of old brick making industry in Bangladesh**

Bangladesh is the 5 most densely populated country ranked 9th largest populous country with 160 million people. Each year 4, 00,000 to 5, 00,000 rural people migrate in Dhaka. The existing people as well as new migrants need housing facility. At present in our country the annually required shelter varies from 3 lakh to 5.5 lakh units. Bangladesh will need to construct approximately six million new houses annually to accommodate the growing population (Rahim, 2011, p. 2). Bangladesh has about 6,000 authorized brickfields and numerous illegal ones. (Bayron, 2009). Rapid urbanization in the country has created a booming construction industry and push the production of 8.6 billion bricks each year, with demand for the bricks rising at an annual rate of about 5.28 percent (UNDP; 2011). The illegal brickfields do not have proper license to keep the fields into track and proper resources to run. The brickfields are typically small independent units and operate 24 hours during the dry season. They are located near towns or major construction sites; i.e., Ashuliya, Gabtali, Narayongonj, Savar, Keraniganj, Narshingdi, Gazipur and Manikganj.

The largest brick making zone is on the north of Dhaka city, where more than 1,000 brickfields are situated (Khan, 2009). The existing technology for firing kiln are fixed chimney kiln (FCK) and bull's trench kiln (BTK); though last one is banned in Bangladesh contributes 16% of production. The main raw materials used in brick kilns to dry bricks are firewood and coal as well as some time use oil. But most of the time they use firewood. As a result a large number of trees like Keora, chaila, sundari, mehguni, bain etc. are being felled madly. Furthermore, using of firewood in kilns also results in significant deforestation and this wood still account for about 25 percent of the fuel used in Bangladesh's brick making kilns every year. The department of environment said that the 4,000 brick kilns burn nearly 20 lakh tons of coal and another 20 lakh tons of wood every year to meet the demand for 400 to 1200 tons of fuel (Roy, 2004). Another investigation reveals that workers of the brick field not only cut many trees but also built dikes to stop water from entering its premises during high tide which results in sudden flood in the adjacent areas. Inquiry suggested that many brick manufacturers set up their kilns near forests with the intention to plain the forests illegally. Beside this, people working in the brickfield because of deadly air and poor water quality have to accept a subhuman life. On an average every worker receives 80 taka every day for over 12 hours of extremely hard or hazardous work (Akter, 2010). In Bangladesh there are three major sources of air pollution, they are-

- (a) Vehicular emission,
- (b) re-suspended road dust
- (c) Small industries like brick kilns and other biomass inclinators (Ferdausi, Vaideeswaran & Akbar, 2008).

Most brick fields have set up 25-foot tin chimneys in place of 120-foot ones, defying government rules. In the brick kilns smokes are wafting out of the chimneys polluting the environment of the area. According to the Brick Kiln Control (amended) Act (2001), there must be no establishment of brick furnace within a three-kilometer radius of human inhabitation as well as fruit garden. But lack of proper monitoring of our government, brickfields have sprung up like mushrooms and the situation has created a serious threat to environment and biodiversity while the people in the neighboring areas face health hazards and fertility of farms is going down (The Daily Star, 2011).

#### **Compensation from The Bangladesh Bank and Private Banks to encourage energy saving automated brickfield by Green Financing:**

Bangladesh is identified by climate change expert as being among the countries more severely challenged by climate change threat. The government and

Bangladesh Bank have remained fully aware and proactive in this respect, using countries own meager resources besides whatever modest support is being provided by the international community.

Bangladesh Bank has proactively come forward to complete the above funds by putting in place a fund of Taka 2.0 billion to refinance lending renewable energy generation and other environmentally beneficial project like energy saving automated brickfield. Taka 838.4 million has already been disbursed from this Bangladesh Bank fund, of which 56.3% was for solar energy, 30.8% for biogas, 9.1% for energy saving brickfield and 4.8% for effluent treatment plants.

### **Cost and productivity of energy saving automated brick technology**

Energy saving automated brick technology has already started working in different areas of our country; i.e., Savar, Dhaka, Ashulia, Mymensingh, Khulna and Norshindi, Narayongonj. Production of such bricks suggested that they need only 40% of human intervention than that of the traditional one and as the production continues throughout the year it keeps all people active without any streamlining. In its preparation, coal and clay are mixed automatically and then poured into a machine. In every piece of brick about 2-3 percent coal is mixed. Bricks are prepared automatically and taken to a silo, and smoke of the kiln for drying the raw bricks (Byron, 2009).

It is the production process used in Diamond Auto Green Brick, Saughat, Narayanganj. Another green brick kiln in Dhamrai use approximately seven to 7.5 tons of coal per 100,000 bricks (Wasserman, 2009). The technology of installing Energy saving automated brick technology is expensive than the traditional one. It will take Tk 5 crore to Tk 10 crore to set up an energy efficient brick kiln that will be able to produce around two crore bricks annually - some 40,000-50,000 bricks per day; whereas Tk 1 crore is required for a old brickfield. The strength of the bricks produced in this way is more than double than that of the old brickfields and lead less than 5% rejects as compared to 25% for the old method. The price of energy saving automated brick technology bricks is also competitive.

Figure 1

	energy saving automated brick technology	Old Type Brick
Set up cost for Brickfield	5-8 crore (Tk.)	1 crore (Tk.)
Price (per piece)	Tk. 6	Tk. 5.50- Tk. 5.80
Production (annual)	3 crore	2 crore
Coal required for 100,000 bricks	12.7-14 ton	56 ton

According to the owner of the Diamond Auto Brick Field, per piece green brick is of Tk 6 and the old one is of Tk 5.50-5.80.

A Comparison between Old type Brick and energy saving automated brick technology (in daily production of 1,00,000 pieces)

Energy saving automated brick technology have some usefulness, they are -

#### **Automated Process**

The production process is fully automated. After the production for drying the bricks a few numbers of people are needed; i.e., for monthly production of 40,000 bricks, it takes 40 to 50 labors at the highest.

#### **Extremely Large Demand**

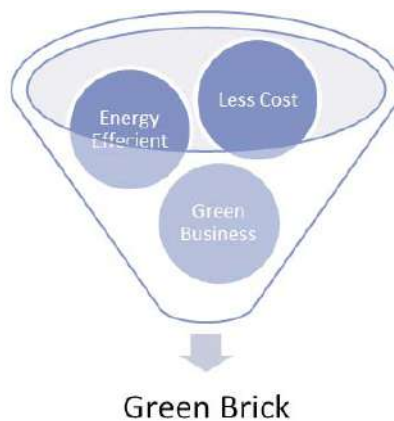
With the increase in the prices of primary electricity and higher production and sales, such as the demand for real estate and the real estate business in Bangladesh, the average demand for such bricks is increasing and green bricks always save as a priority.

#### **Assemble through Carbon Credit**

Less carbon emissions are available in the air, from the developed countries, an annual income of 2 million can be found.

#### **Secured & Quick of Investment**

According to Auto Greene Brick Field in Ashulia, the cost of production of prescribed production and green brick kiln was recovered within just one year.



### **Carbon Credit Market and Energy Saving Brickfield**

at present, 6000 old brickfields are emitting 8.75 million tons carbon annually. According to the UNDP, Bangladesh uses about 23 tons of coal to produce 100,000 bricks, compared with China, which uses 7.8 to 8 tons of coal to produce the same amount, source (The Daily Ittefaq, 2009). Bangladesh's brick industry has grown approximately 5.8 percent during the last decade- it represents one of the largest sources of greenhouse gas emissions in the country. In the Figure 4 we find that in 2010, total carbon dioxide emissions in whole world reached 50.39 million Metric Tons (mn MT); within which estimated at 35 million tons of carbon dioxide due to the use of automated technologies and substandard fuels such as wood, sulphur coal and the burning of tires. The figure also suggests that on a per capita basis meanwhile, Bangladesh is ranked at 172 worldwide, with per capita emissions increasing on 2010 by 0.02 metric tons to 0.33 metric tons. By following the vulnerable situation, UNDP is providing the energy efficient brick making technology Hybrid Hoffman Kiln (HHK) to make clean bricks (The News Today, 2011) and reduce carbon emission. The annual greenhouse gas emissions by the old brickfield is equivalent to emissions of more than 230,000 passenger vehicles or carbon sequestered by more than 250,000 acres of pine or fir forests. A single kiln that runs on HHK technology will produce 15 million bricks and cut carbon emission by 5,000 tons a year. A double unit kiln will produce 30 million bricks and cut carbon dioxide (CO<sub>2</sub>) emission every year (Byron, 2009). The secret to the Hybrid Hoffman Kiln's success is its ability to completely burn most of the fuel that is mixed into the bricks during firing, and thereby drastically reduce energy use. It also dries the bricks by directing hot air into the tunnel from the annular kiln, which blocks greenhouse gas emission (UNDP, 2011).

However, Bangladesh can earn substantial revenue through selling carbon as carbon credit like China and India in the international market by using modern technology in brickfields surrounding Dhaka city. According to the Collins English Dictionary carbon credit is a certificate showing that a government or company has paid to have a certain amount of carbon dioxide removed from the environment. Emission trading is another term related to carbon trading is a market-based approach which is used to control pollution by receiving economic incentives for achieving reductions in the emissions of pollutants (i.e., carbon etc.).

As per the guidelines of the Kyoto protocol, Bangladesh will get 15.20 dollars from the global Community Development Carbon Fund for reducing each ton of carbon emissions (The Daily Ittefaq, 2009). From this point of view if Bangladesh

can reduce the amount of emissions at least 50% of 8.75 (4.17%) million tons through technology transfer, the country will get huge revenue amounted \$70 million a year from global carbon trading fund. A country's leading non-banking financial institution, Industrial and Infrastructure Development Finance Company (IIDFC) has already entered into two agreements named "emission reduction purchase agreements (ERPA)" with the World Bank and the Danish Energy Agency (DEA) to help in reducing carbon emissions from brickfields. As per agreements, the World Bank and Denmark will buy 189,000 and 60,000 emission reductions respectively (Khan, 2009).

### **Findings**

Energy saving automated brickfield technology is beneficial both for humanity and environment. Lower loss of fire woods, less burning of coals, low demand for clay, low intervention of human bodies etc. are the different encouraging sides of Energy Saving Automated Brickfield Technology. The analysis suggested that, any energy saving automated brickfield technology producing 70,000 bricks daily need maximum 40 labors. Bangladesh can achieve Tk. 200,000 for five years' production of grin brick for reducing carbon emission. As Energy Saving Automated Brickfield Technology ensures whole year productivity rather than seasonal productivity it can easily cope with increasing demands of bricks in Bangladesh. Beside Bangladesh Bank is well aware of the environment degradation situation as mentioned above and has already given time to time directions to all scheduled banks for green finance. Commercial banks are now required to ensure necessary measures to protect environmental pollution while financing a new energy saving project like as energy saving automated brickfield. All banks adopt environmentally responsible financing, weighing up environmental risks of project before making financing decision so financing is not a big problem for energy saving automated brickfield. Green finance work for environmental risk management in consideration as a part of green financing. Bangladesh bank will declare the names of the top ten banks for their overall performance in green financing activities in the BB websites.

### **Recommendations**

Government need to push people by creating awareness against traditional kilns and make the technology simply available to the brick manufacturers. Electronic and print media should come forward to encourage people for using such kinds of bricks. More marketing is required to familiarize people with green bricks. To

encourage entrepreneurs, banks need to provide long-term loan. But the problem is in receiving loan from banks, an entrepreneur has to complete a large number of formalities including verification of certificates and licenses. To avoid such unfairness policy makers should make process this easy and should modernize the policies and regulations with demand of time.

### **Conclusion**

At present energy saving automated brickfield technology has been branded as one of the most important fact for the fresh environment. From 2011 Bangladesh bank has launched green financing in the financial sector. Now-a-days Bangladesh Bank already made significant head way, motivating bankers into activism towards environmental awareness and environmental financing. Bangladesh bank has also extended a refinance scheme of Tk. 200 crore in 2011 to establish and spread the technology. Different banks have already started providing loan for energy saving automated Brickfield establishment with payback period of 5 years. Government need to push people by creating awareness against old brick field and make the technology simply available to the brick manufacturers. Electronic and print media should come forward to encourage people for using such kinds of bricks. More marketing is required to familiarize people with energy saving automated brickfield. All private bank try encourage entrepreneurs for long-term loan to make energy saving automated brickfield. From 31st December, 2012 all the old brick fields losed their validity for working which will also reinforce traditional brick makers to collapse their production and start with energy saving automated brickfield system.

Using energy saving automated brickfield may easily reimburse bank's loan within a year. Time has come to take right measures to protect our environment and turn our country into a better living place for the next generation. The banking sector can play a pivotal role in green financing. If we are able to mobilize cash to facilitate energy saving automated brickfield it will bring a fresh environment as early as possible. If green finance failure it will bring a profound impact on our environment. Whether the ambitious climate and sustainability goals can be achieved, will depend significantly on the determination with which these actors drive the development of green banking forward.

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## Due Diligence in Bangladesh Monetary and Credit Program Path Derivation

IMAM ABU SAYED\*

**Abstract:** *In general it is expected that bankers need to maintain plain, fair and true principle in communicating financial aspects to the stakeholders. Bankers possess specialized knowledge in formulating banking policies related to economics, finance and accounting. Bankers need to put the interest of stakeholders ahead of their own. Bankers require to keep continuous learning efforts regarding the continuously shifting paradigm of economics. Bearing in mind this development in solicited and unsolicited communication bankers necessitates putting utmost personal endeavour and keeping themselves logical avoiding fallacy. In central banking bankers require to follow due diligence particularly in Bangladesh monetary and credit program path derivation. Due diligence issue relating to Bangladesh monetary and credit program path is demonstrated in this paper for better communicating to the stakeholders. Consequently, central banker can serve for the betterment of the stakeholders and country applying fiduciary responsibility.*

### Introduction

Among interest rate, exchange rate, asset price and monetary/credit channels, this paper concentrated on monetary and credit channels impacting inflation and GDP. Bangladesh monetary and credit program and balance of payment are technical and crucial issue. In order to address this concern, plain and fair approaches have followed with due diligence. Bangladesh monetary and credit program requires specialised knowledge related to economics, banking, finance and accounting. Econometric knowledge is also required to understand the dynamics of monetary policy. In Bangladesh, monetary and credit programming firstly, I have derived yearly program path taking into account related macroeconomic developments.

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\* Deputy General Manager (Research), Monetary Policy Department, Bangladesh Bank

Quarterly segregation of monetary and credit program is impacted by seasonality. In such case monthly seasonal factors are used for smoothing. According to the quantity theory of money, inflation is directly related with money supply. Real GDP is also vital factor of money supply. This paper, from quantitative and qualitative point of view, highlighted these factors as a part of plain and fair communication to the stakeholders. This study unfolds the vital macroeconomics dynamics to commune the stakeholders. This will contribute to take informed decision by the stakeholders about the monetary economics interactions.

### Organization of the paper

Literature review is presented in section I. Section II deals with research methodology. Derivation of Bangladesh monetary and credit program applying due diligence is described in section III. Conclusion is made in section IV.

## Section I

### Literature review

Sayera and Akhtaruzzaman (2012) pointed out that the objective of their study is to explore the inflation-economic growth linkage, if any, in Bangladesh. With this view, various tables and charts, correlation matrices, pair-ranger Causality tests and quadratic regression equation estimated by OLS based time series annual data covering the sample period from 1976 to 2012 are used. The results of all data including regression analysis convincingly demonstrate that the relationship between inflation and growth is non-linear with an existence of a threshold level (relative to the threshold) would be hurtful for growth in terms of potential cost of forgone output and, at the same time, too high level of inflation would also impede economic growth. Thus, Government's inflation target of 7.5 percent set in FY 12/13 budget seems to be reasonable as it stands within the range threshold levels of inflation found in the study.

Taylor (2009) rule in equation form:  $\tau_t = \pi_t + \tau_t^* + \alpha_\pi (\pi_t - \pi_t^*) + \alpha_\gamma (\gamma_t - \gamma_t)$ . In this equation,  $\tau_t$  is the target short-term nominal interest rate (e.g. the federal funds rate in the USA, the Bank of England base rate in the UK),  $\pi_t$  is the rate of inflation as measured by the GDP deflator,  $\pi_t^*$  is the desired rate of inflation,  $\pi_t^*$  is the assumed equilibrium real interest rate,  $\gamma_t$  is the logarithm of real GDP, and  $\gamma_t$  is the logarithm of potential output, as determined by a linear trend. In this equation, both  $\alpha_\pi$  and  $\alpha_\gamma$  should be positive (as a rough rule of thumb, Taylor's 1993 paper proposed setting  $\alpha_\pi = \alpha_\gamma = 0.5$ ). That is, the rule "recommends" a relatively high interest rate (a "tight" monetary policy) when

inflation is above its target or when output is above its full-employment level. By specifying  $\alpha_\pi > 0$ , the Taylor rule says that an increase in inflation by one percentage point should prompt the central bank to raise the nominal interest rate by more than one percentage point (specifically, by  $1 + \alpha_\pi$ , the sum of the two coefficients on  $\pi_t$  in the equation above). Since the real interest rate is (approximately) the nominal interest rate minus inflation, stipulating  $\alpha_\pi > 0$  implies that when inflation rises, the real interest rate should be increased. Taylor explained the rule in simple terms using three variables: inflation rate, GDP growth, and the interest rate. If inflation were to rise by 1 percent, the proper response would be to raise the interest rate by 1.5 percent (Taylor explains that it doesn't always need to be exactly 1.5 percent, but being larger than 1 percent is essential). If GDP falls by 1 percent relative to its growth path, then the proper response is to cut the interest rate by 0.5 percent. The central bank does not need to take fluctuations in the output gap into account when setting interest rates (that is, it may optimally set  $\alpha_\pi = 0$ ).

The money supply and MM related issues of developed and developing countries have been widely worked out. Johannes and Rasche (1979), Bomhoff (1997), Park (1980), Arby (2000), Ford and Morris (1996), Baghestani and Moot (1997) have pursued studies on money supply and MM of different countries. They highlighted the degree of controllability over money supply by the monetary authority, stability and predictability of money supply, determinants of money supply and policy implications for governing monetary policy. Accordingly, BB's MM is disaggregated to understand the impact on inflation and other rates of the economy.

## Section II

### Research methodology

Technical analysis, quantity theory of money and rational expectation with due diligence is considered in Bangladesh monetary and credit program path derivation of Bangladesh. Seasonality, past trends, domestic and global development and unconventional monetary policy emphasising thrust sector sectors is applied in this paper. The deviation of program and actual path of Bangladesh monetary and credit program and balance of payments variables are graphically shown to understand the future outcome.

### Section III

#### Derivation of Bangladesh monetary and credit program applying due diligence

Before moving towards quantity theory of money and judgemental approach, I have tested fifteen hypotheses related to Bangladesh monetary and credit program.

1. The stability of GDP test result is BLUE following ARMA model. Equation:  $bd\_growth = c + a \cdot bd\_growth(-1) + ma(1) + trend + u$ . To test the GDP stability in Bangladesh we can use this model. Diagnostic tests on residual. a. Serial Correlation test b. Heteroskedasticity test and c. Non-normality test. Sayed (2014) deals with ARMA model.

OLS method

- Equation:  $gdp = \alpha + \beta M_2 + \varepsilon$
  - Hypothesis testing:  $\beta_t \neq 0$ . Reject the null  $\beta_t = 0$  and accept the alternative hypothesis that is  $\beta$  is different from zero due to high t-value.
  - $|t_{cal}| > |t_{tab}|$ , Z test, F statistic and adjusted  $R^2$
  - Checking multicollinearity in the data. Testing the variance inflated function  $(VIF) = 1/(1-r^2_{23})$ .
  - Maximum log likelihood
  - Checking structural break in the data and set dummy if necessary.
  - Making the regression BLUE. OLS is described by Sayed et al. (2016).
2. The noteworthy hypothesis of Bangladesh monetary and credit programme is to amplify of share of time deposit (TD) in M2. The share of TD was 75.76% at the end of June 2010, which accomplished at 76.03% at the end of June 2013. Introduction of plastic card, online and mobile banking and financial engineering can provide impetus in this regard.
  3. Optimization of DMBs excess reserves using OMOs. Sayed (2016) explained excess reserves.
  4. Technical exercise implies foreign exchange reserves can be increased of higher level addressing BOP accounts.
  5. Particular and complementary solution determines the government bonds price and coupon rates. Sayed (2016) elaborated this issue.
  6. ARIMA model implies maintaining auto regressive (AR) process the exchange rate can be forecasted. Setting  $ARIMA(p,d,q) = ARIMA(1,1,0)$  [for

example]. Determine quarterly seasonality in Bangladesh's M2 for instance. ARIMA is described by Sayed (2015).

7. The exercise of ARDL model suggests there is long run relationship between M<sub>2</sub> and nominal GDP. ARDL Bounds Test  $\Delta GDP_t = \beta_0 + \sum_{i=1}^k \beta_{1i} \Delta GDP_{t-i} + \sum_{i=1}^k \beta_{2i} \Delta M2_{t-i} + \beta_3 GDP_{t-1} + \beta_4 M2_{t-1} + \varepsilon_t$

ARDL restricted ECM =  $GDP_t = \beta_0 + \sum_{i=1}^k \beta_{1i} \Delta GDP_{t-i} + \sum_{i=1}^k \beta_{2i} \Delta M2_{t-i} + \gamma ECM_{t-1} + \varepsilon_t$

- Unit Root Test for Stationarity . Combination of I(0) and I(1) is required for ARDL.
  - Lag order selection: According to the AIC, among the top 20 model our best model is ARDL (3,2) for instance.
  - Diagnostic checking
  - Breusch-Godfrey Serial Correlation LM test and unit root of the model residuals
  - Autoregressive Conditional Heteroskedasticity (ARCH) test
  - Ramsey RESET (regression specific error test)
  - Cumulative sum (CUSUM) to test the stability of long run coefficient. ARDL is presented by Sayed et al. (2016).
8. We failed to reject the null hypothesis as there is no unit root according to the test statistics.
9. Bidirectional causality found in VAR.
10. In VAR model the estimated coefficient of  $\beta_t \neq 0$  is accepted due to high t-value. Exercised VAR model in the study is:
- $$(X1)_t = a_0 + \sum_{j=1}^k a_{1j}(X1)_{t-j} + \sum_{j=1}^k a_{2j}(X2)_{t-j} + \sum_{j=1}^k a_{3j}(X3)_{t-j} + \sum_{j=1}^k a_{4j}(X4)_{t-j} + u1t$$
- Orthogonalised residuals regressed each other
  - Checking the bidirectional causality between X and Y
  - Unit root
  - Exoginity test
  - Variance decomposition. Shock explains the forecast error variance. For example checking the exchange rate pass-through on GDP.
  - Analysis of IRF (positive and negative shock)
  - Forecasting (with the estimated coefficients and checking lower average RAMSE). VAR model is described in Sayed (2015) paper.
11. According to co integration test, there is long run relationship among the stipulated variables.
12. In VECM there is positive relationship between RM and inflation.

Exercised VEC model+ is:  $D(\ln inflation(X1)) = \alpha_0 + \sum_{i=1}^k \alpha_i \Delta X1_{t-1} +$

$$\sum_{i=1}^k \alpha_2 \Delta X2_{t-1} + \sum_{i=1}^k \alpha_3 \Delta X3_{t-1} + \sum_{i=1}^k \alpha_4 \Delta X4_{t-1} + \epsilon_t$$

VECM is addressed in Sayed (2013) article.

- Trace and Maximum Eigen Value Test for co-integration
  - Test of cointegration rank
  - Speed of adjustment
  - Test for misspecification
  - Test on weak exogeneity
  - IRF
13. Determination of priors and potential priors using DSGE. Filtering of de-seasonalized logarithmic data with the Hodrick-Prescott (HP) filter or by detrending. Comparing priors and posteriors mean for interest rate increase to curb inflation for example. Conditional variance decomposition of the interested variables. Younus (2017) Working Paper can be consulted regarding DSGE model.
  14. Equilibrium exchange rate can be maintained following REER based exchange rate. REER is presented in Sayed (2015) paper.
  15. Using monetary tools and economic findings the stability of MM need to be maintained in Bangladesh.

Brief on econometrics exercise related to monetary variables of Bangladesh are highlighted in **Annexure**.

### Quantity theory of money in short

Following quantity theory of money safe limit of monetary expansion in a year has been derived in this paper. Money supply more than safe limit is considered as expansionary monetary policy. Money supply less than safe limit is considered as contractionary monetary policy. Accommodative monetary policy is the in between of expansionary and contractionary monetary policy. To achieve the potential level of GDP growth and low and stable inflation BB may prudently decide what type of monetary policy will be followed. Potential level of GDP growth is the average of previous few years recent real GDP growth. Average 6 percent-7 percent inflation rate considering the business cycle is the indicator of optimum inflation level. Considering Bangladesh GDP growth model (ARMA) and correlation of GDP and inflation solving quantity theory of money ultimately participatory and judgemental approach are pursued in quantifying M2, RM and BOP growth numbers. In participatory monetary policy stakeholders' opinion are



considered. Average of real GDP growth rate and inflation with future expectation are considered in this paper for formulating monetary expansion for next financial year. BB considers upcoming year government budget declared GDP and inflation rate rather average of this two variables in monetary expansion.

Finally, income velocity of money derives dividing nominal GDP by M2, which is declining trend region in the U shaped curve. Decline in income velocity of money indicates that still there is room for broad money growth in Bangladesh. Change in income velocity of money for FY 2012-13 is estimated on average at 1.90 percent. Quantity theory of money can be resolved plugging 5-year average annual GDP growth rate and future expectation (7.0 percent), 5-year annual inflation rate (6.0 percent) and past 5-year average annual percentage changes in income velocity of money combining future expectation ( 1.90 percent). Upcoming year GDP growth and inflation rate is found from the national budget for quantifying of safe limit of monetary growth in a year. Considering real economic developments these numbers may change.

We know  $MV=PY$

Log function is required to work out the equation.

Thus, we get  $\ln M + \ln V = \ln P + \ln Y$

Or,  $(1+M)(1+V) = (1+P)(1+Y)$

Or,  $(1+M) = (1+P)(1+Y)/(1+V)$

Or,  $M = ((1+P)(1+Y)/(1+V)) - 1$

Or,  $M = ((1+0.060)(1+0.070)/(1+(-)1.90) - 1$

Or,  $M = (1.1342/(1-0.019)) - 1$

Or,  $(1.1342/0.981) - 1$

Or,  $1.15617 - 1$

Or,  $0.15617$

Or,  $15.6\%$

Here, M= yearly broad money growth, P= CPI inflation rate, Y= real GDP and V= percentage change in income velocity of money. Hence, real GDP growth, inflation and percentage change in income velocity of money provides us safe limit of monetary expansion in a financial year considering the money demand. M2 plot can be demonstrated summing real GDP growth, CPI inflation and income velocity of money (**Chart 1**).

In the quantity theory of money equation if we assume GDP and velocity as constant then the direct relationship between money (M2) and inflation (P) can be found (**Chart 2**). In **Chart 2** M2 affect inflation with few lags. At the beginning

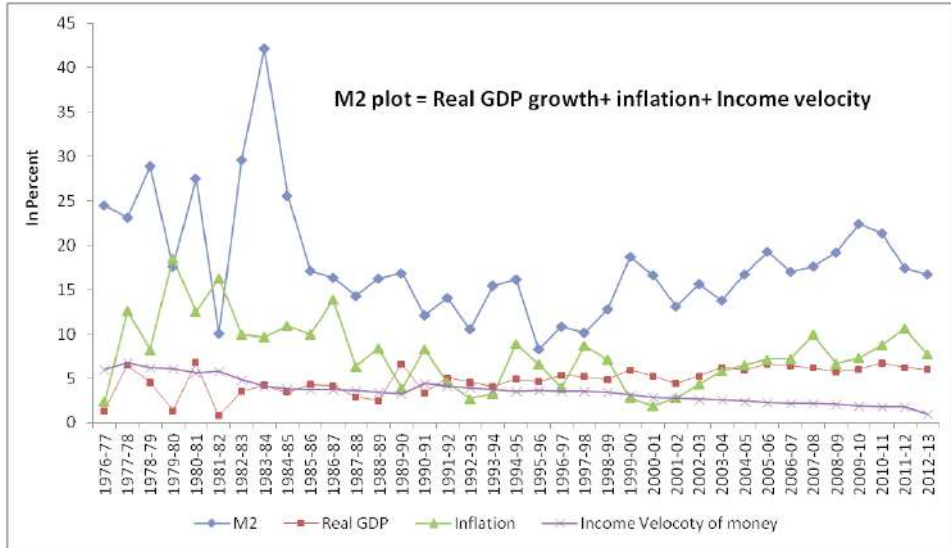


Chart 1

the augment in M2 also contributes to enhance in CPI inflation. In the plot the relation of money and inflation is clear. Seasonality, demand pull and cost push factors may create volatility in inflation apart from money supply.

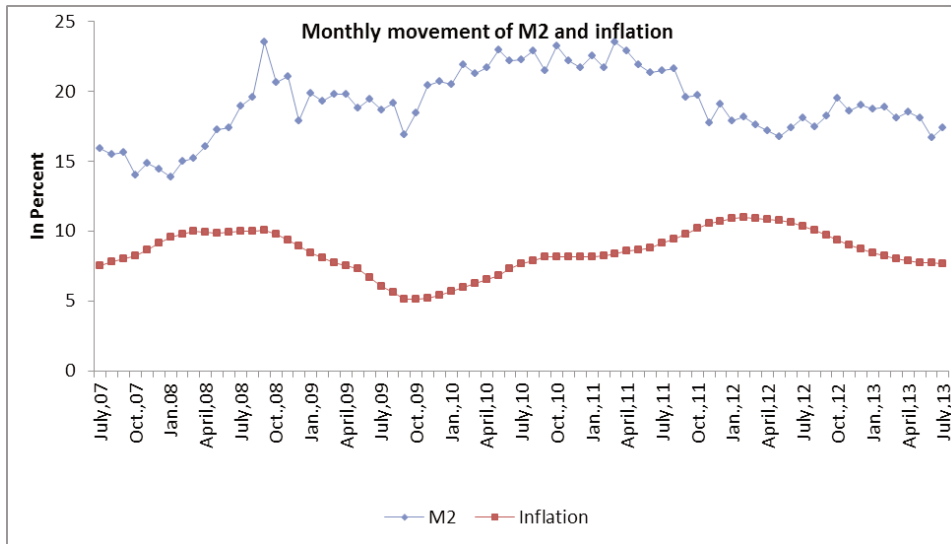


Chart 2

### Component wise Bangladesh monetary and credit programme with due diligence

Historical data and current demand observed from the quantity theory of money have been observed in deriving monetary programming numbers of Bangladesh. Maintenance of optimum inflation and GDP growth is central aspect of monetary policy. BOP end June 2012 overall surplus US\$ 89.4 crore (**Table-5**) is added with RM end June 2012 NFA to arrive June 2013 number, which is equivalent to Tk. 76123.70 crore (**Table-3**). In this conversion exchange rate used Tk. 80.0 against 1 US\$ at the end of June 2013. DMBs asset and liabilities of foreign exchange holdings is added with the NFA of RM in order to get relevant NFA of M2 (**Table-1**). The noteworthy hypothesis of Bangladesh monetary and credit

Table-1: Monetary and credit programme (In crore Taka)

Particulars	Outstanding stock (Actual)			Program 2012-13		
	June, 2010	June, 2011	June 2012	September 2012	December 2012	March 2013
	1	2	3	4	5	6
<b>A. Net Foreign Assets of banking system</b>	<b>67073.70</b>	<b>70620.00</b>	<b>78860.30</b>	<b>90112.10</b>	<b>81795.20</b>	<b>83697.10</b>
		(+5.29)	(+11.67)	(+14.27)	(+3.72)	(+6.13)
<b>B. Net Domestic Assets of banking system</b>	<b>295957.50</b>	<b>369899.90</b>	<b>438249.20</b>	<b>445991.00</b>	<b>476207.50</b>	<b>493707.10</b>
		(+24.98)	(+18.48)	(+1.77)	(+8.66)	(+12.65)
a) Domestic credit	340213.70	433525.90	518214.30	529960.70	567201.00	584198.90
		(+27.43)	(+19.53)	(+2.27)	(+9.45)	(+12.73)
Public sector	69453.00	92813.20	110312.70	109923.30	120542.80	123142.30
		(+33.63)	(+18.85)	(-0.35)	(+9.27)	(+11.63)
Govt.(net)	54392.30	73436.10	91906.80	91901.20	103119.10	105919.10
		(+35.01)	(+25.15)	(-0.01)	(+12.20)	(+15.25)
Other Public	15060.70	19377.10	18405.90	18022.10	17423.70	17223.20
		(+28.66)	(-5.01)	(-2.09)	(-5.34)	(-6.43)
Private sector	270760.70	340712.70	407901.60	420037.40	446658.20	461056.60
		(+25.84)	(+19.72)	(+2.98)	(+9.50)	(+13.03)
b) Other items (net)	-44256.20	-63626.00	-79965.10	-83969.70	-90993.50	-90491.80
		(+43.77)	(+25.68)	(+5.01)	(+13.79)	(+13.16)
<b>C. Broad money (A+B)</b>	<b>363031.20</b>	<b>440519.90</b>	<b>517109.50</b>	<b>536103.10</b>	<b>558002.70</b>	<b>577404.20</b>
		(+21.34)	(+17.39)	(+3.67)	(+7.91)	(+11.66)
i) Currency outside banks	46157.10	54795.10	58417.10	61214.50	63072.71	65361.80
		(+18.71)	(+6.61)	(+4.79)	(+7.97)	(+11.89)
ii) Deposits	316874.10	385724.80	458692.40	474888.60	494929.99	512042.40
		(+21.73)	(+18.92)	(+3.53)	(+7.90)	(+11.63)
a) Demand deposits	41831.30	48305.90	51304.30	49794.90	74729.79	72904.50
		(+15.48)	(+6.21)	(-2.94)	(+45.66)	(+42.10)
b) Time deposits	275042.80	337418.90	407388.10	425093.70	420200.20	439137.90
		(+22.68)	(+20.74)	(+4.35)	(+3.14)	(+7.79)

Note: Figures in brackets indicate percentage changes over end June.

programme is to amplify of share of time deposit (TD) in M2. The share of TD was 75.76 percent at the end of June 2010, which accomplished at 76.03 percent at the end of June 2013. Introduction of plastic card, online and mobile banking and financial engineering can provide impetus in this regard.

Government sector credit expansion from the banking system to implement the ADP is expected to Tk. 23624.00 crore for FY 2012-13. The borrowing amount declares in the national budget, which is subject to change according to revised ADP. Subsequently, additional amount can also be estimated bearing in mind declining trend of non-bank and foreign funds maintaining overall budget deficit

Table 2: Monetary and credit programme

Particulars	Outstanding stock		
	June, 2013 (Programme)	June, 2013 (Actual)	Difference between Programme and Actual of June, 2013
1	2	3	4
<b>A. Net Foreign Assets of banking system</b>	<b>86496.00</b>	<b>113384.80</b>	<b>-26888.8</b> (-31.09)
<b>B. Net Domestic Assets of banking system</b>	<b>516207.10</b>	<b>490120.60</b>	<b>26086.50</b> (+5.05)
a) Domestic credit	616209.30	571737.10	44472.20 (+7.22)
Public sector	1326541.10	119579.90	1206961.20 (+90.99)
Govt.(net)	115530.80	110124.60	5406.2 (+4.68)
Other Public	17123.30	9455.30	7668.00 (+44.78)
Private sector	483555.20	452157.20	31398.00 (+6.49)
b) Other items (net)	-100002.20	-81616.50	-18385.70 (+18.39)
<b>C. Broad money (A+B)</b>	<b>602703.10</b>	<b>603505.40</b>	<b>-802.30</b> (-0.13)
i) Currency outside banks	67573.50	67552.90	20.60 (+0.03)
ii) Deposits	535129.60	535952.50	-822.90 (-0.15)
a) Demand deposits	76892.50	56050.20	20842.30 (+27.11)
b) Time deposits	458237.10	479902.30	-21665.2 (-4.73)

Note: Figures in brackets indicate percentage changes over end June of previous fiscal.

at 5 percent level of GDP. Through treasury bills and bonds government obtain money from DMBs. This mode of financing will be elaborated later in section V. Other public sector credit is expected to decline due to privatization process of the state owned enterprises (SOEs) during that time period. Negative growth rate 6.97 percent is assumed in this sector. Public sector credit programmed 20.25 percent expansion for FY 2012-13 (**Table-1**). Private sector credit component is elaborated in the SBS of BB. This is the thrust sector of the economy. Private sector credit is ranged from personal loan to manufacturing industry. Housing loan, auto loan, crop loan, credit card to the common people like developed country encouraging financial inclusion as well as monetization in Bangladesh. Following related economic standpoint private sector credit growth is expected to 18.55 percent in FY 2012-13 (**Table-1**). Private sector growth is estimated at 9.50 percent and 13.03 percent the end of December, 2012 and March 2013 respectively. The main component of other item (net) is inter-bank asset of unclassified asset inter-bank liabilities and contingent liability of unclassified liability. Other item (net) can be plus or minus nature in the balance sheet.

The deviation of actual and forecasted path of NFA, NDA, government and private sector credit and M2 is very minimum at the end of June 2013 (**Chart 3**). Deploying judgemental approach and econometric tools, I have forecasted the related variables of M2. As a result, the exercise of M2 and RM programme need to be meticulously followed combining four sectors of the economy.

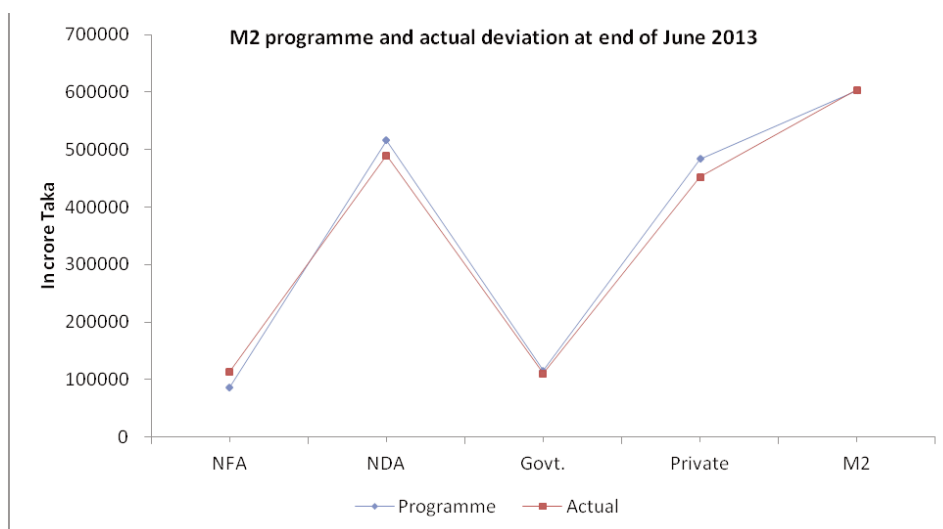


Chart 3

It may be noted that forecasting of private sector credit and currency using ARIMA procedure can be attainable as it is stochastic. Using auto regressive process with seasonality, we can technically predict the private sector credit and currency subject to stability in mm. NFA of M2 and RM, government sector credit, claims on DMBs and time deposits are deterministic. As a result, prediction of these elements is unyielding using random technique.

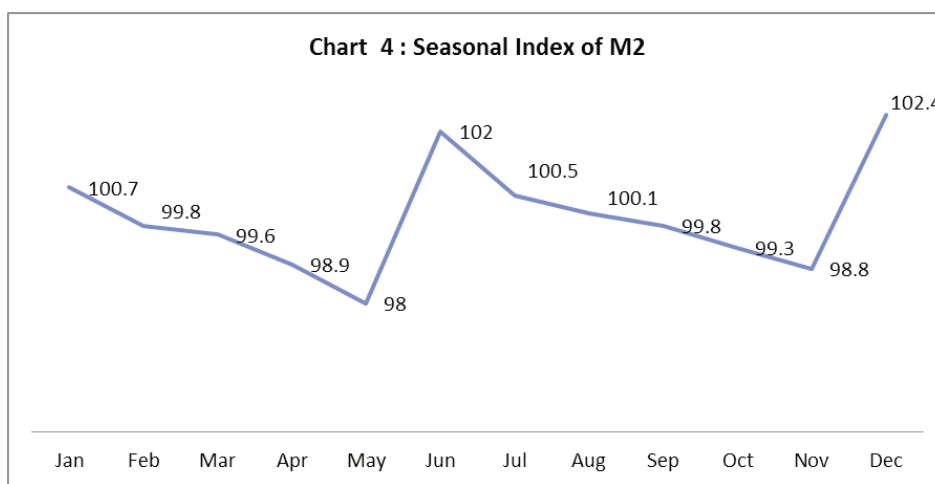


Chart 4

#### **Seasonality of M2 in Bangladesh monetary and credit programming (Chart 4)**

In the seasonal index, oscillation is found for the month of June and December. For the surge of M2 during the mentioned period seasonal factor need to understand. Proper seasonal treatment is required to incorporate to watch in-depth each variable of monetary aggregates for monetary programming of Bangladesh.

#### **Reserve money programming number in brief**

In the NDA of RM (**Table-3**) claims on DMBs depend on liquidity need maintained through repo, special repo, LSF, refinancing programme, loan reverse repo. Refinancing is provided to export and small and medium enterprise (SME) for poverty alleviation generating employment. The growth programmed in this sector 5.29 percent at the end of June, 2013. The government sector credit is programmed 6.35 percent growth subject to over draft (current) and overdraft (blocked) account adjustment and loan requirement of the government for supporting development works. The RM growth is programmed as 6.26 percent,

10.35 percent and 14.95 percent at the end of December, 2012, March, 2013 and June, 2013. Accordingly, the MM are calculated as 5.17, 5.14 and 5.36 at the end of December, 2012, March, 2013 and June, 2013.

Particulars	June, 2010	June, 2011	June 2012	September 2012	December 2012	March 2013	June 2013
	1	2	3	4	5	6	7
<b>Net Foreign Assets of Bangladesh Bank</b>	<b>61204.90</b>	<b>61388.70</b>	<b>68971.70</b>	<b>78730.50</b>	<b>71139.20</b>	<b>74060.90</b>	<b>76123.70</b>
		(+0.30)	(+12.35)	(+14.15)	(-3.14)	(+7.38)	(+10.37)
<b>Net Domestic Assets of Bangladesh Bank</b>	<b>19305.40</b>	<b>28345.70</b>	<b>28831.00</b>	<b>21228.30</b>	<b>32787.20</b>	<b>33865.50</b>	<b>36302.70</b>
		(+46.83)	(+1.71)	(-26.37)	(+13.72)	(+17.46)	(+25.92)
Claims on Govt.(net)	22320.60	32049.70	38044.00	35859.10	37298.00	37800.10	40458.20
		(+43.59)	(+18.70)	(-5.74)	(-1.96)	(-0.64)	(+6.35)
Claims on other public	830.70	736.70	1181.90	1027.30	604.30	600.21	580.03
		(-11.32)	(+60.43)	(-13.08)	(-48.87)	(-49.22)	(-50.92)
Claims on DMBs	6613.90	18608.80	22627.40	15297.60	21824.33	23123.90	23824.21
		(+181.36)	(+21.60)	(-32.39)	(-3.55)	(+2.19)	(+5.29)
Other items (net)	-10459.80	-23049.50	-33022.30	-30955.70	-26939.43	-27658.71	-28559.74
		(+120.36)	(+43.27)	(-6.26)	(-18.42)	(-16.24)	(-13.51)
<b>Reserve money</b>	<b>80510.30</b>	<b>89734.40</b>	<b>97802.70</b>	<b>99958.80</b>	<b>103926.40</b>	<b>107926.40</b>	<b>112426.40</b>
		(+11.46)	(+8.99)	(+2.20)	(+6.26)	(+10.35)	(+14.95)
<b>Currency Issued</b>	<b>50465.40</b>	<b>60526.90</b>	<b>64896.50</b>	<b>68244.90</b>	<b>69702.01</b>	<b>72279.60</b>	<b>74582.40</b>
		(+19.94)	(+7.22)	(+5.16)	(+7.40)	(+11.38)	(+14.93)
i) Currency outside banks	46157.10	54795.10	58417.10	61214.50	63072.71	65361.80	67573.50
		(+18.71)	(+6.61)	(+4.79)	(+7.97)	(+11.89)	(+15.67)
ii) Cash in tills	4308.30	5731.80	6479.40	7030.40	6629.30	6917.80	7008.90
		(+33.04)	(+13.04)	(+8.50)	(+2.31)	(+6.77)	(+8.17)
<b>Deposits held with BB</b>	<b>30044.90</b>	<b>29207.50</b>	<b>32906.20</b>	<b>31713.90</b>	<b>34224.39</b>	<b>35646.80</b>	<b>37844.00</b>
		(-2.79)	(+12.66)	(-3.62)	(+4.01)	(+8.33)	(+15.01)
Of which: Excess reserves	12402.90	4082.50	3363.30	490.10	6586.39	3846.80	3444.00
		(-67.08)	(-17.62)	(-85.43)	(+95.83)	(+14.38)	(+2.40)
<b>Reserve money multiplier</b>	<b>4.51</b>	<b>4.91</b>	<b>5.29</b>	<b>5.36</b>	<b>5.37</b>	<b>5.35</b>	<b>5.36</b>

Note: Note: Figures in brackets indicate percentage changes over end June.

The government deposits all its cash balances with BB free of interest. BB provides up to Tk. 4000 crore for day to day operation of the government using ways and means account with reverse repo rate (5.25 percent) as government has taxing capacity. Government can borrow money through overdraft paying reverse repo rate plus one percent (6.25 percent) with seigniorage effect and inflation if the borrowing is unplanned. 91-Day government treasury bill rate is applicable for government blocked account loan taken through over draft from BB. Claims on other public sector include SOEs elaborated in the SBS. According to exercise improvement of balance sheet position of SOEs is expected during FY 2011-13.

BBs other item (net) comprises among others interest suspense account of unclassified assets Asian Clearing Union (ACU) and IMF Trust Fund (PRGF) of foreign liabilities. IMF loan increasing liability contributes in gross foreign exchange reserve building. The foreign exchange reserves is derived with the help of technical analysis for the first time using recent data and ultimately matched with the BOP different accounts for maintaining high foreign exchange reserves, which will contribute for better credit rating of the country.

Gross foreign exchange reserve US\$ 10111.0 million for end February 2012 covering different foreign currency ( USD, pound, euro and other currency totalling US\$ 8717.0 million), SDR holdings (US\$727.61 million), Gold (US\$654.08 million), reserve position in the IMF (US\$0.66 million) and other foreign accounts (US\$11.77 million). Exchange rate of end June 2011 is used in this calculation to comprehend the erosion of foreign exchange over time in the BOP frontier. Appreciation of Dollar against SDR for instance will generate less amount of Dollar in a contract with the IMF. The gross foreign exchange reserve using current market rate is US\$ 10066.77 million for end February 2012. Stated that NFA of BB is equivalent to gross foreign exchange reserves deducting liabilities includes for example Asian Clearing Union (ACU) balance, project FC account and FC clearing account. The divergence between programme and actual RM is exhibited in Table 4.

Following monetary aggregates RM and M2 liabilities side currency figure is stochastic. Currency data of different period shows it's positively related to transaction demand with respect to GDP and inflation and inversely related to interest rate of banks and national savings certificates (NSC). Precautionary demand for money represented by broadly demand deposit (checking account) of real money balance (M1) is positively related to income. Speculative demand (time deposit) is inversely related to interest rate. It may be pointed out that printing of notes (Taka) for a year depends on GDP growth, inflation rate and amount of torn notes. Financial innovations include debit card, credit card and mobile banking reducing the amount of cash demand. DMBs maintain reserves with BB for daily transaction consequences. DMBs target is to acquire marginal efficiency in terms of keeping minimum reserves in Taka denomination. DMBs demand and time deposits 6 percent (CRR) along with foreign currency clearing account balance is preserved as reserves in the balance sheet of BB. To avoid the liquidity shortfall arising from cheque clearing DMBs retain Taka with BB more than cash reserve requirement (CRR). For liquidity management purpose excess reserves is calculated deducting CRR from local currency balance. Growth in currency reduces the excess reserves of DMBs. Largely deposit growth depends on financial engineering.

High currency deposit ratio and reserve deposit reserve ratio lower the MM increasing high powered money (RM). Accordingly OMO, repo, reverse repo and foreign exchange sale/purchase is deployed allowing for short term liquidity management and keeping the desired rates. Auction of government treasury bills and bonds is used for debt management tools. These are the indirect instrument of monetary policy. Apart from those direct instruments CRR, SLR, bank rate and



Table - 4 : Reserve money Programme

(In crore Taka)

Outstanding stock			
Particulars	June, 2013 (Programme)	June, 2013 (Actual)	Difference between Programme and Actual of June, 2013
1	2	3	4
<b>Net Foreign Assets of Bangladesh Bank</b>	<b>76123.70</b>	<b>103246.00</b>	<b>-27122.30</b> (-35.63)
<b>Net Domestic Assets of Bangladesh Bank</b>	<b>36302.70</b>	<b>9243.40</b>	<b>27059.30</b> (+74.54)
Claims on Govt.(net)	40458.20	27069.00	13389.20 (+33.09)
Claims on other public	580.03	1354.50	-774.47 (-133.52)
Claims on DMBs	23824.21	10219.00	13605.21 (+57.11)
Other items (net)	-28559.74	-29399.10	839.36 (-2.94)
<b>Reserve money</b>	<b>112426.40</b>	<b>112489.40</b>	<b>-63.00</b> (-0.06)
<b>Currency Issued</b>	<b>74582.40</b>	<b>75372.30</b>	<b>-789.90</b> (-1.06)
i) Currency outside banks	67573.50	67552.90	20.60 (+0.03)
ii) Cash in tills	7008.90	7819.40	-810.50 (-11.56)
<b>Deposits held with BB</b>	<b>37844.00</b>	<b>37117.10</b>	<b>726.90</b> (+1.92)
Of which: Excess reserves	3444.00	3302.00	142.00 (+4.12)
<b>Reserve money multiplier</b>	<b>5.36</b>	<b>5.36</b>	<b>0.00</b>

Note: Figures in brackets indicate percentage changes over end June of previous fiscal.

discount window is used sparsely. RM is mainly deterministic. BB reins M2 through MM. Currency deposit ratio and reserve deposit ratio elements of liability side of M2 and RM determine the magnitude of MM. RM is the operating target of monetary policy. Credit to government from the DMBs is complementary (necessary) element. On the other hand claim on government from BB is substitute owing to opportunity cost of funds with seigniorage and inflation effect. Eventually, the holders of Taka need to bear the cost of government seigniorage

gain. Concentration of asset due to unproductive investment in private and public sector stimulate the income inequalities in the country impacting the benefit of GDP growth.

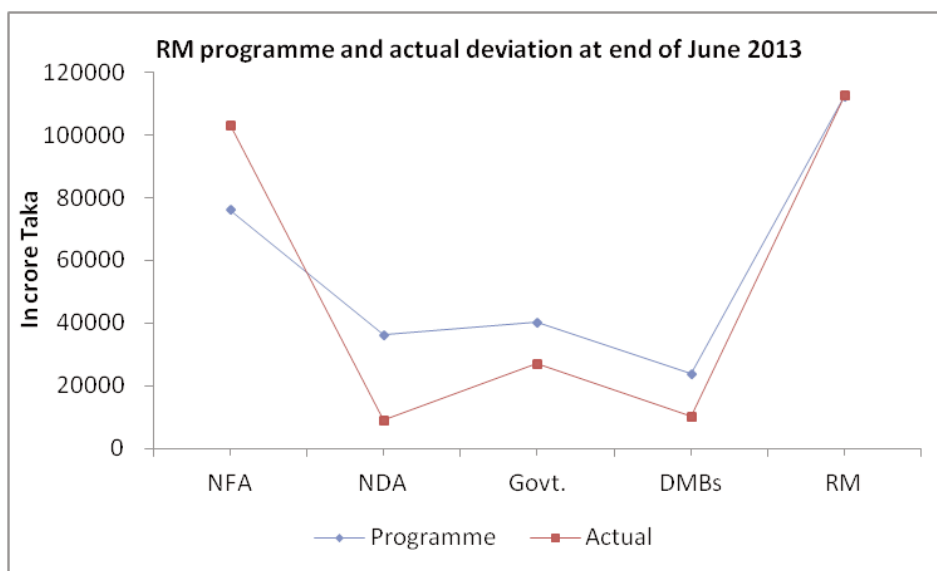


Chart 5

The challenge of BB is to monitor the RM using OMOs tools. We observe (**Chart 5**) the programme and actual deviation of NFA, NDA, government sector credit and loans to banks. But the programme and actual RM are same at the end of June 2013 for effective formulating of RM. Surge in overall balance of BOP has contributed to increase in NFA resulting decline in NDA. NFA positively contributed to the economy. Government borrowed less in FY 2013 from the BB. DMBs amount are also decreased comparing programme due to less demand of money in this sector. BB has role to operate the OMOs prudently to manage the high powered money (RM) for maintain stability in MM.

### Money multiplier

In monetary and credit programming of Bangladesh RM is used as operating target. M2 is the intermediate target and inflation and GDP growth is ultimate target. Stability in MM  $(1+c/d)/(c/d+r/d)$  is assumed in monetary programming, which is the research question of this paper. Stable and upward MM balances the inflation, GDP growth interest and exchange rate, from macroeconomic point of view. Central bank tools open market operations (OMOs) and government debt management tools includes banks finance to government are used to create the

orderly situation in money market of Bangladesh. Currency outside banks and reserves are the two components of RM from liability side. Currency and reserve numbers are arrived from the Issue Department and Banking Department balance sheet of BB. Increase in currency outside banks and reserves (DMBs balance with BB) will reduce the MM. Increase in currency outside banks increase the high powered money with inflationary impact. While increase in DMBs reserve with BB assuming constant deposit growth will reduce the MM without creating inflation that much. In such case, considering the economic situation BB can utilize the excess reserves of RM proving loan at discount rate to the small and medium enterprises (SME). Stable and upward MM (**Table-3**) through central bank operations will smooth monetary data generating process (DGP) with white noise econometric regression inference and less losing of degrees of freedom.

MM of Bangladesh observes volatility in some extent influencing interest rate, exchange rate and inflation. Currency deposit ratio (c/d) and reserve deposit ratio (r/d) determines the magnitude of MM. Deposit growth depends on currency demand and financial engineering. The monetization rate in Bangladesh is sixty percent of GDP in relation to interest rate sensitivity and its pass-through in the economy. Currency is a random factor. Excessive government borrowing from BB enlarge the RM creating volatility in MM. Money multiplier can enter solving  $(1+c/d)/(c/d+r/d)$ . Programmed currency and deposit amount for end June 2013 is Tk. 67576.50 crore and Tk.535129.60 crore. Reserve amount Tk.44852.90 crore contains cash in tills and balances with BB. To arrive MM 5.36 for end June 2013 the calculated c/d is 0.12628 and r/d is 0.08382. The long range MM can be found in **Chart 6**.

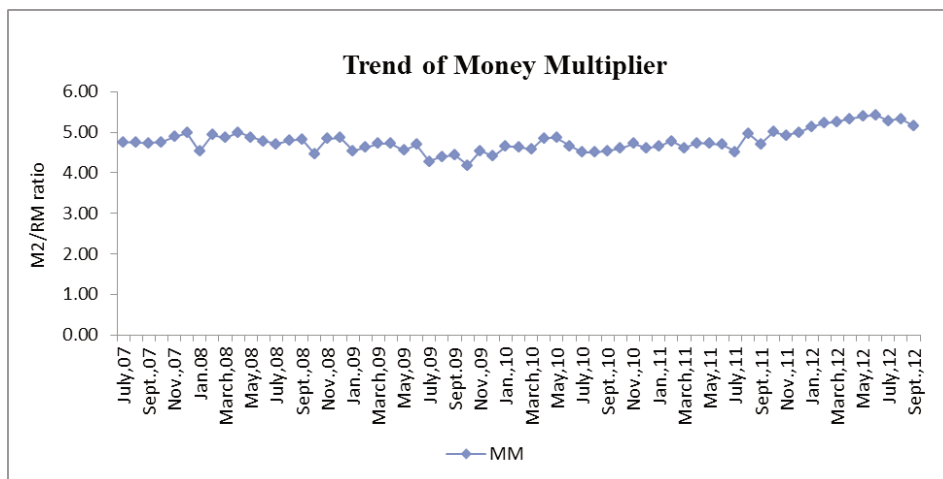


Chart 6

**Balance of payments accounts programme in short**

Export and import growth for FY 2011-13 is programmed 12.59 percent and 13.54 percent (Table-5) correspondingly keeping the momentum of the economy.

Table 5: Balance of payments Programme

(In million USD)			
Particulars	FY 2011-12 (Actual)	FY 2012-13 (Actual)	FY2012-13 (programme)
<b>Trade balance</b>	<b>-7995</b>	<b>-7009</b>	<b>-9304</b>
Exports f.o.b(including EPZ) <sup>1/</sup>	23992	26567	27013
	(+4.28)	(+10.73)	(+12.59)
Imports f.o.b(including EPZ)	31987	33576	36317
	(+5.44)	(+4.97)	(+13.54)
<b>Services</b>	<b>-2566</b>	<b>-3162</b>	<b>-2345</b>
Credit	2684	2830	2780
Debit	5250	5992	5125
<b>Primary income</b>	<b>-1508</b>	<b>-2369</b>	<b>-1865</b>
Credit	195	120	140
Debit	1703	2489	2005
Of which: Official interest payment	373	476	193
<b>Secondary income</b>	<b>13699</b>	<b>14928</b>	<b>14765</b>
Official transfers	105	97	160
Private transfers	13594	14831	14605
of which : Workers' remittances ( current a/c. portion)	12843	14338	14218
	(+10.24)	<b>2388</b>	(+10.71)
<b>Current account balance</b>	<b>1630</b>	<b>629</b>	<b>1251</b>
<b>Capital account</b>	<b>469</b>	<b>629</b>	<b>512</b>
Capital transfers	469	0	512
Others	0	<b>2863</b>	0
<b>Financial account</b>	<b>-955</b>	<b>1726</b>	<b>-869</b>
<b>i) Foreign direct investment(net)</b>	<b>995</b>	<b>368</b>	<b>1017</b>
<b>ii) Portfolio investment (net)</b>	<b>198</b>	<b>123</b>	<b>28</b>
<b>iii) Other investment(net)</b>	<b>-2148</b>	<b>769</b>	<b>-1914</b>
MLT loans <sup>2/</sup>	1460	2085	2163
MLT amortization payments	789	906	889
Other long-term loans (net)	-57	-150	101
Other short-term loans (net)	242	-100	-139
Trade credit (net)	-1450	-250	-1890
Other assets	-1606	0	-1315
<b>DMBs &amp; NBDCs(net)</b>	<b>52</b>	<b>90</b>	<b>55</b>
Assets	443	396	440
Liabilities	495	486	495
<b>Errors and omissions</b>	<b>-650</b>	<b>-752</b>	<b>0</b>
<b>Overall balance</b>	<b>494</b>	<b>5128</b>	<b>894</b>
Reserve assets	-494	-5128	-894
<b>Bangladesh Bank(net)</b>	<b>-494</b>	<b>-5128</b>	<b>-894</b>
Assets	293	5196	686
Liabilities	201	68	208

1/ Excludes local sales reported by EPB. Some adjustments necessiated by BOP considerations have been made.

2/ Excluding supplier's credit, reclassified as trade credit below.

Workers remittance is expected to uphold stable growth at 10.71 percent. As a result, US\$ 1251 million will be surplus in the current account. MLT loans expected to generate US\$ 2163 million (**Table-5**) in the financial account channelizing pipeline credit. Other long-term loan (net) will reach at US\$ 101 million at the end of June 2013. DMBs contribute about US\$ 55 million. Altogether the overall surplus US\$ 894 million is intended. Increase of BBs asset position US\$ 686 million and decrease of liabilities number US\$ 208 million is calculated in this regard.

According to IMF BOP Manual (BPM-6) Income and Current Transfer head of BPM-5 will be termed as Primary Income and Secondary Income of Current Account Balance (CAB). There is also among others difference in sign treatment between BPM-5 and BPM-6 for debit and credit entry. Export of Trade Balance is compiled using Export Promotion Bureau (EPB) data on value of goods without shipment cost (f.o.b. price). BB data is used for calculation of Import at f.o.b. (freight on board) price. Service head Debit mainly includes transportation and travel cost for instance comprising medical and education cost abroad. FDI, Portfolio Investment, Other long-term and Short-term interest is included in the Debit account of Primary Income. Grant component Food aid and Commodity aid is included in the Official Transfers of Secondary Income of CAB.

Project aid is integrated in the Capital Account. Portfolio Investment relates to investment in the capital market. FDI is the most precious investment of Financial Account. Financing through Economic Relations Divisions such as loan from World Bank, ADB or other agencies together with specific country is counted in the Medium and Long Term Loans head of Financial Account. Other long-term loans (net) speak about private sector loan. Bangladesh Petroleum Corporation loan is built-in Other short-term loan account. Difference between EPB and BB export data is known as Trade Credit (net). Difference mainly relating to export and import of Export Promotion Zone (EPZ) is captured in Other Assets account. Reporting error and exchange rate difference is reflected in the Errors and Omissions account of Financial Account. Positive sign in the Asset side of BB means increases of liability may be from IMF. Negative sign indicates increase of Liability. Overall Balance of BOP emerges in the table increasing the liabilities of BB following BPM-6. Overall balance of BOP can be increased considering higher foreign exchange reserves. Performing technical analysis with the past short term range data of foreign exchange may increase the NFA of BB. Technical exercise implies foreign exchange reserves can be increased at higher level addressing BOP accounts. ARIMA exercise can be deployed in this regard. We

know that the NFA of BB is derived from the overall balance of BOP. If the balance of a particular year (end June) is US\$ 100 and the overall balance of BOP is US\$ 10 then the total NFA of BB will be US\$110. In technical analysis, the overall balance of BOP may be generated as US\$ 20. Then the total NFA will be US\$120. The extra US\$ 10 need to be distributed in the MLT accounts of BB. So, the increased amount in MLT of BOP will increase the overall balance of BOP. Good governance, confidence of foreign remitter in home country investment, increase in export and FDI can ensure extra amount of inflow of foreign funds through MLT and other relevant accounts of BOP and contributes in pilling up substantial foreign exchange reserves. The foreign exchange reserves is derived with the help of technical analysis for the first time using recent data and ultimately matched with the BOP different accounts for maintaining high foreign exchange reserves, which will contribute for better credit rating of the country. BOP programme and actual position can be found in **Table-6**. **Chart 7** is signifying the difference of BOP programme and actual numbers.

Monetary, external, fiscal and real sector development and their interaction can be quantified in tabular form (**Table-7**). This is how I can establish the sectoral relationship of the economy.

Higher overall balance (**Chart 7**) of BOP has contributed to increase the foreign exchange reserves in the country. Consequently, BB needs to apply proper sterilization policy to maintain the Taka rate against US dollar. NDA is derived

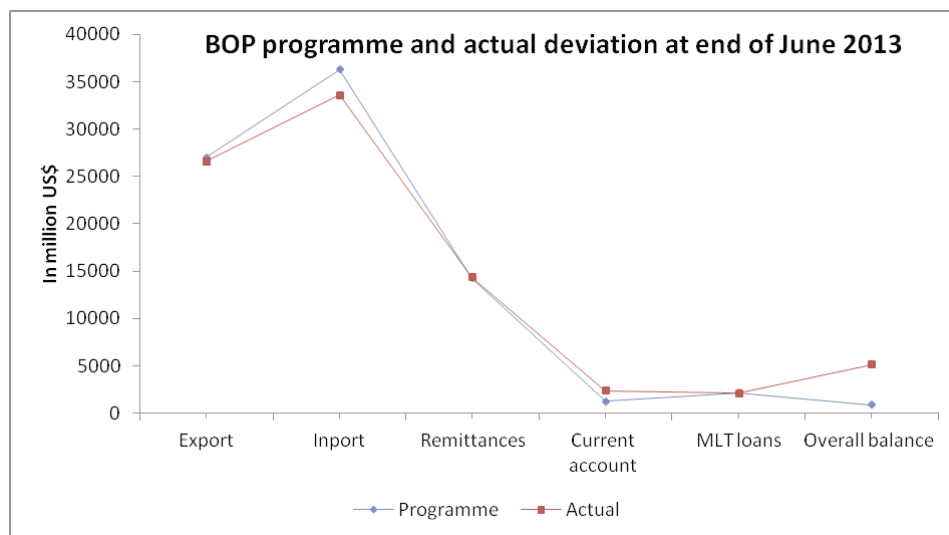


Chart 7

Table-6: Balance of payments programme

(In million USD)

Particulars	FY2012-13 (programme)	FY2012-13 (Actual)
<b>Trade balance</b>	<b>-9304</b>	<b>-7009</b>
Exports f.o.b(including EPZ) <sup>1/</sup>	27013	26567
	(+12.59)	(10.73)
Imports f.o.b(including EPZ)	36317	33576
	(+13.54)	(+4.97)
<b>Services</b>	<b>-2345</b>	<b>-3162</b>
Credit	2780	2830
Debit	5125	5992
<b>Primary income</b>	<b>-1865</b>	<b>-2369</b>
Credit	140	120
Debit	2005	2489
Of which:Official interest payment	193	476
<b>Secondary income</b>	<b>14765</b>	<b>14928</b>
Official transfers	160	97
Private transfers	14605	14831
of which : Workers' remittances ( current a/c. portion)	14218	14338
<b>Current account balance</b>	<b>1251</b>	<b>2388</b>
<b>Capital account</b>	<b>512</b>	<b>629</b>
Capital transfers	512	629
Others	0	0
<b>Financial account</b>	<b>-869</b>	<b>2863</b>
<b>i) Foreign direct investment(net)</b>	<b>1017</b>	<b>1726</b>
<b>ii) Portfolio investment (net)</b>	<b>28</b>	<b>368</b>
		123
<b>iii) Other investment(net)</b>	<b>-1914</b>	<b>769</b>
MLT loans <sup>2/</sup>	2163	2085
MLT amortization payments	889	906
Other long-term loans (net)	101	-150
Other short-term loans (net)	-139	-100
Trade credit (net)	-1890	-250
Other assets	-1315	0
<b>DMBs &amp; NBDCs(net)</b>	<b>55</b>	<b>90</b>
Assets	440	396
Liabilities	495	486
<b>Errors and omissions</b>	<b>0</b>	<b>-752</b>
<b>Overall balance</b>	<b>894</b>	<b>5128</b>
Reserve assets	-894	-5128
<b>Bangladesh Bank(net)</b>	<b>-894</b>	<b>-5128</b>
Assets	686	5196
Liabilities	208	68

1/ Excludes local sales reported by EPB. Some adjustments necessiated by BOP considerations have been made.

2/ Excluding supplier's credit, reclassified as trade credit below. P= Provisional. R= Revised

from RM minus NFA. As a result, we have watched the lower growth in NDA (Chart 5) of RM. Other components of BOP follows stable programmed and actual paths.

Table 7 : Bangladesh : National Accounts Indicator

	Actual		Provisional	Estimated	Projection
	2008-09	2009-10	2010-11	2011-12	2012-13
<b>A. Real Sector(%)</b>					
National income and prices (percent change)					
Nominal GDP growth (% change)	12.6	12.9	13.4	15.9	14.1
Real GDP	5.7	6.1	6.7	7.0	7.2
CPI Inflation (average)	6.7	7.3	8.8	9.5	7.5
Total Domestic Investment as percent of GDP	24.4	24.4	24.7	25.9	26.6
Domestic saving	20.1	20.1	19.6	20.2	19.9
National saving	29.6	30.0	28.4	26.3	26.8
<b>B. Fiscal Sector (%)</b>					
Total revenue					
Tax	10.4	10.9	11.8	12.6	13.4
No-ntax	8.6	9.0	10.1	10.6	11.2
	1.8	1.9	1.7	2.0	2.2
Total expenditure					
Revenue expenditure	14.3	14.6	16.2	17.7	18.5
Annual Development Program	11.2	11.0	12.0	13.2	13.2
	3.2	3.7	4.2	4.5	5.2
Budget overall balance (Excluding grant)					
Financing (net) in percent	-3.9	-3.7	-4.4	-5.1	-5.0
Domestic financing					
Banking source	3.1	2.3	3.8	3.8	3.3
non-bank	2.2	-0.3	3.2	3.2	2.4
Foreign financing	0.9	2.6	0.6	0.6	0.9
	0.8	1.3	0.6	1.3	1.8
<b>C. Monetary Sector</b>					
Money and credit (percent change)					
Net domestic assets	17.8	18.8	25.0	21.9	15.8
Private sector	15.9	17.6	28.4	19.1	18.0
Broad money (M2)	19.2	22.4	21.4	17.0	16.0
<b>C. External Sector</b>					
Balance of payments (percent change)					
Exports, f.o.b.	10.1	4.2	41.7	14.5	14.5
Import, c.i.f.	4.2	5.4	41.8	15.0	15.0
Remittances( US\$ billion)	9.7	11.0	11.7	12.9	14.5
Current account balance (%of GDP)	2.7	3.7	0.9	0.4	0.2
Gross official reserves (US\$ billion)					
Gross official reserves (months of import)	7.5	10.7	10.9	9.7	10.7
	3.8	5.1	3.6	2.9	2.7

Source: Medium-Term Macroeconomic Outlook : FY11-FY17 Finance Division, Ministry of Finance GOB  
Bangladesh Economic Review, 2012

### Unconventional monetary policy for ensuring inclusive GDP growth

The other objectives of monetary policy are ensuring inclusive GDP growth following unconventional monetary policy for reduction of poverty and minimizing the income inequalities. In this regard credit to small and medium



enterprises (SME), progressive tax policy, green banking, mobile banking, refinancing from BB for supporting agriculture and export are pursuing for ensuring inclusive growth and robust financial sector.

#### **Section IV**

##### **Conclusion**

Presenting the crucial and dynamics of monetary policy is the noteworthy outcome of this paper. Yearly and quarterly Bangladesh monetary and credit program path derivation approach will help the stakeholders to move the economy in desired direction. Quantity theory of money and other fundamental technical analysis are lucidly described in this paper for moving towards higher growth frontier with optimum inflation. Central bank core function can be consulted by the stakeholders as the paper concentrated on Bangladesh monetary and credit program path derivation with due diligence.

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**Annexure**

Brief on econometrics exercise related to monetary variables of Bangladesh are highlighted next.

**1. ARMA model****Bangladesh GDP stability test**

The 8th model is an autoregressive moving average process, ARMA(5,5) process with one lag interval, which can be elaborated as:

$$bd\_growth = a + b \text{ bd\_growth}(-1) + c \text{ bd\_growth}(-3) + d \text{ bd\_growth}(-5) + ma(1) + ma(3) + ma(5) + u$$

$$bd\_growth = 0.19 + 0.88 \text{ bd\_growth}(-1) - 0.26 \text{ bd\_growth}(-3) + 0.37 \text{ bd\_growth}(-5) - 0.99 u_{t-1} + 0.39 u_{t-3} - 0.36 u_{t-5}$$

$$\text{Adjusted } R^2 = 0.62 \quad \text{Schwarz criterion} = 2.85$$

Here coefficients of growth at lag 1, lag 5 and with error term at lag 1 are highly significant; coefficient of growth at lag 3 and coefficients of error term at lag 5 are statistically significant; and coefficients of error term at lag 3 is tending toward statistical significance. Goodness of fit is improved significantly.

From the above models, the model 8 is better than all other models from the viewpoint of goodness of fit, the significance of the coefficients and Schwarz criterion.

However, in determination of appropriate model, it has to satisfy the conditions of no serial correlation, no heteroskedasticity and non-normality error. **The stability of GDP test result is robust following diagnostic test.** The diagnosis of these tests for model is given below:

**Serial Correlation test:** The correlogram of residuals (Q-stat) at lag 4, 8 and 12 are shown below:

$$Q\text{-stat at lag 4: } 3.57 (0.06), \text{ lag 8: } 5.21(0.39), \text{ lag 12 : } 7.69 (0.57)$$

Q-stat at all conventional lags indicates that there is no serial correlation in the residual.

**Heteroskedasticity test:** The correlogram of squared residuals at lag 4, 5 and 12 are shown below:

$$\text{lag 4: } 3.35 (0.07), \text{ lag 5: } 5.23 (0.39), \text{ lag 12 : } 5.59 (0.78)$$

After taking correlogram of squared residuals, I do not find any evidence of heteroskedasticity at conventional lags length.

**Non-normality test:** To test non-normality error, Jarque-Bera test is made and found the following results

Jarque-Bera : 1.83 (0.40)

The value of Jarque-Bera indicates that there has been non-normality error in the distribution. Basically the distribution has an excess kurtosis.

**OLS model**

Drawing OLS regression model stating dependent and independent variables:

$$Y = \beta_1 + U_i$$

$$Y = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 X_5 + U_i$$

Here, dependent variable is ACI stock price denoted by Y and the independent variables are:  $X_1$  = DSE all share price index;  $X_2$  = Risk free rate of return;  $X_3$  = Consumer Price index (CPI);  $X_4$  = Gold Price and  $X_5$  = Petroleum Price.

Correlation coefficient

	DSE	TBILL	CPI	Gold	Petroleum
DSE	1				
TBILL	0.128	1			
CPI	0.234	0.148	1		
Gold	0.286	0.277	0.348	1	
Petroleum	0.149	0.301	0.136	-0.064	1

Source: Authors' Calculation

Empirical Results (ACI and DSE)

Variable	Coefficient	t-Statistic	Probability	F-statistic
DSE	1.1377	5.1794	0.0000	26.8259

Source: Authors' Calculation

Empirical Results (ACI and all variables under consideration)

Variable	Coefficient	t-Statistic	Probability
DSE	1.2447	5.5122	0.0000
T-Bill	-0.2318	-1.0074	0.3209
CPI	-3.3427	-1.7364	0.0915
Gold Price	-0.1081	-0.0025	0.9980
Petroleum Price	18.6000	0.6609	0.5131
F-statistic=6.5115			

Source: Authors' Calculation

## 2. ARDL model

### The Interrelationship between Money Supply and Nominal GDP in Bangladesh

#### Granger Causality Test

Hypothesis	Probability
GDP does not Granger cause M2	0.041
M2 does not Granger cause GDP	0.323

Source: Statistics Department of BB and Bangladesh Bureau of Statistics (BBS).Year:2014

### Empirical Results and Analysis

#### Unit Root Test for Stationarity

The choice of most appropriate unit root test is difficult in practice. Ender (1995) suggested that a safe choice is to use unit root test—the Augmented Dickey–Fuller (ADF) (1981) test. The Augmented Dickey-Fuller (ADF) test is widely applied for unit root tests. Therefore, to test stationarity, we conducted the widely used method of unit root tests—the ADF test—on the variables M2 and nominal GDP for Bangladesh. The unit root tests were performed at level and at first difference with the trend and intercept term. The optimum lag was selected by using the Akaike Information Criterion (AIC). A summary of the ADF unit root test result is presented in Table.

#### Augmented Dicky Fuller Test of Unit root

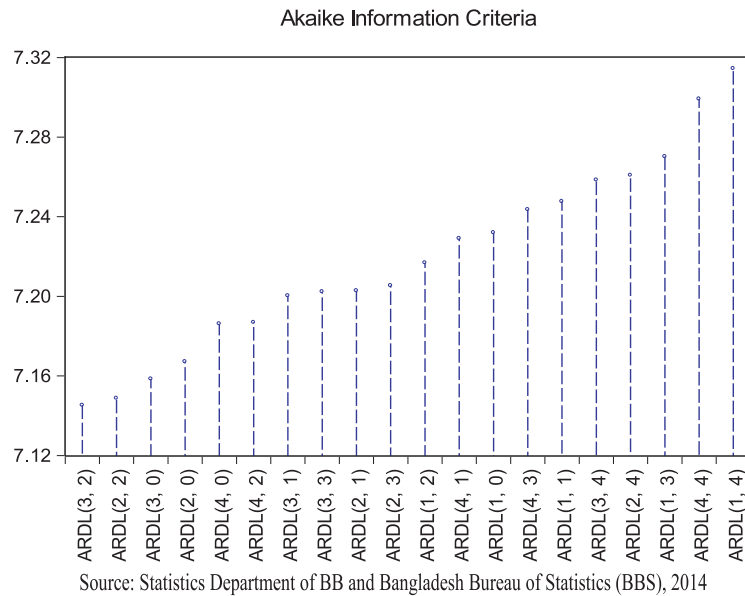
Variables	Model	T-statistic	Integration
GDP	Trend and intercept	-6.005[0.000]	I(0)
M2	Trend and intercept	-5.499[0.000]	I(1)

Source: Statistics Department of BB and Bangladesh Bureau of Statistics (BBS), 2014

Shows that GDP is I(0) and M2 is I(1), which is in a mixed form. None of variable is I(2). This suggests to perform ARDL Bound test approach (Pesaran, 2001).

#### Model Selection Criterion

The criterion for variables lag order selection is presented in the following graph. On the basis of the Akaike Information Criterion (AIC), the optimal lag length has been selected. According to the AIC, among the top 20 model our best model for this study is ARDL (3,2) model.



**Results of the ARDL Bounds Tests**

In order to determine the presence of a long run relationship between the variables M2 and nominal GDP the bounds test is conducted. The result of Bounds test is presented in Table.

**Bounds Test Result**

F-statistic = 6.045		
Level of Significance	Lower Bound Value	Upper Bound Value
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

Source: Statistics Department of BB and Bangladesh Bureau of Statistics (BBS), 2014

**Long Run Estimation**

Dependent Variable: GDP				
Variables Name	Coefficient	T-Ratio	Std. Error	P-Value
M2	0.401936	0.233080	1.724457	0.0950
C	6.238098	4.324278	1.442576	0.1590

Source: Statistics Department of BB and Bangladesh Bureau of Statistics (BBS), 2014

## Short Run Estimation and ECM

Dependent Variable: GDP				
Variables Name	Coefficient	T-Ratio	Std. Error	P-Value
D(GDP(-1))	0.133802	0.142892	0.936381	0.3561
D(GDP(-2))	-0.127510	0.100318	-1.271051	0.2131
D(M2)	0.061721	0.228660	0.269926	0.789
D(M2(-1))	-0.428651	0.220000	-1.948417	0.061
CointEq(-1)	-1.144009	0.275178	-4.157337	0.0001

Cointeq = GDP - (0.4019\*M2 + 6.2381 )

Source: Statistics Department of BB and Bangladesh Bureau of Statistics (BBS), 2014

It is evident from Table that the computed F-statistic based on Wald test is 6.045 which exceeded the all upper bounds value. As the co-integration exists among the variables used in the model, therefore, the result presented for the long run are reliable.

According to the AIC an ARDL (3,2) model is selected in this study. Long-run and short run estimated coefficient of ARDL is presented in Tables. The estimated coefficient of GDP is 0.40, which is significant at 10% level. GDP coefficient suggests that nominal GDP rises by 40 basis point due to 1 unit change in M2. The error correction term is -1.14 and significant at 1% level, which implies that disequilibrium in long-run equilibrium, is adjusted to steady path if there is shock in the system.

Lag	LM F-statistic	P-value
1	0.273	0.605
2	0.224	0.801

**Autocorrelation Diagnostic checking**

Breusch-Godfrey Serial Correlation LM test and unit root of the model residuals are examined to see if there is any autocorrelation. The LM test is performed at different lags which are given below:

The F statistic value of LM test up to lag 2 is insignificant at 5% level of significance, suggesting there is no autocorrelation in the model residuals.

Correlogram Q-statistics up to 16 lags shows that none of the statistics is significant. This result also conform to the findings from Breusch-Godfrey Serial Correlation LM test that there is no serial correlation in the residuals.



**Heteroskedasticity Test**

It is likely that time series data shows variability over time that is residuals can be

Lag	Chi-Square value	p-value
1	0.065	0.799

heteroskedastic. So, Autoregressive Conditional Heteroskedasticity (ARCH) test is used to see whether the conditional variances of errors identical or varying across time. The following table gives the result of ARCH test for heteroskedasticity.

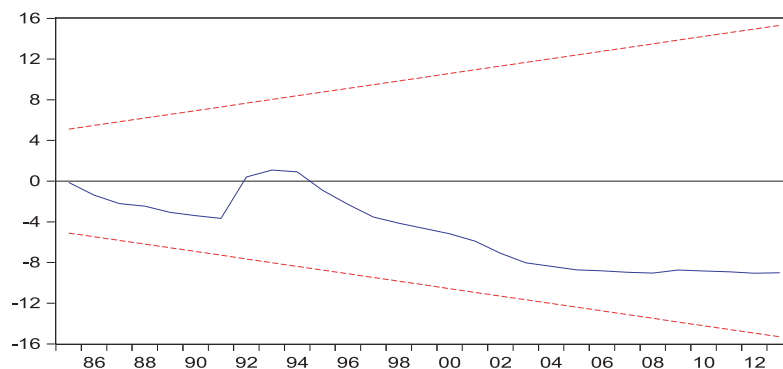
The above results shows that the probability values of chi-square for selected lag are greater than 5% level of significance, which suggests the null hypothesis that there is no ARCH up to the order specified by the lag cannot be rejected.

Omitted variables	F statistic	p-value
Squares of regressors	0.306	0.585

**Model Specification Test**

The model specified in this study is correctly formed according to Ramsey RESET (Regression Specific Error Test) test which is a general test to check the correctness of the specification of the model. The results of Ramsey RESET test is furnished in the following manner:

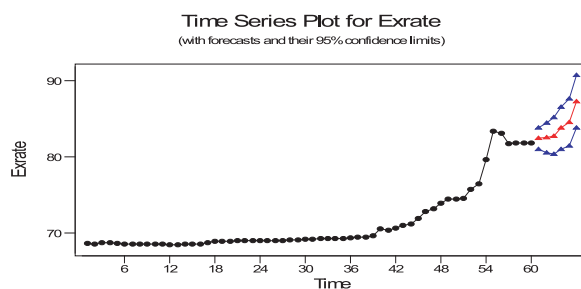
The p values of F statistic indicates the null hypothesis that the coefficients of omitted variables (squares of fitted regressors) is zero cannot be rejected at 5% level of significance. It means that the model without any quadratic terms of specified regressors is a good fit.



Source: Statistics Department and Bangladesh Bureau of Statistics (BBS), 2014

### Stability Test

Cumulative sum (CUSUM) test has been examined to test the stability of long run coefficient. The result obtained is given in the following figure Stability test of coefficient. It can be seen from the above Figure that the plot of CUSUM stays within the critical 5% bounds which confirms the stability of coefficient in the long run.



95 percent confidence level (with seasonality) (Taka/US\$ exchange rate)

Month average	Forecast	Lower	Upper	Actual
July 12	82.432	81.0529	83.8112	81.7715
August 12	82.5303	80.5743	84.4863	81.5160
September 12	82.7584	80.3559	85.1610	81.7286
October 12	83.8163	81.0340	86.5985	81.3123
November 12	84.5619	81.4422	87.6815	
December 12	87.2837	83.8563	90.7111	

Source: Authors' Calculation

### 4. VAR model

Variance Decomposition of LNREMIT:

Period	S.E.	EXRATE	LNEXPORT	LNIMPORT	LNREMIT
1	0.074232	14.98364	25.11464	2.450293	57.45143
2	0.080250	24.93988	21.71999	2.804236	50.53589
3	0.096091	28.91536	17.08647	3.345848	50.65231
4	0.101997	33.75897	15.16939	4.301009	46.77063
5	0.109251	36.08092	13.55246	4.750810	45.61581
6	0.113257	38.31229	12.63199	5.560966	43.49475
7	0.117049	39.58967	11.95621	6.099145	42.35498
8	0.119648	40.62891	11.48602	6.836234	41.04884
9	0.121898	41.27726	11.15878	7.439006	40.12496
10	0.123650	41.73331	10.91049	8.132011	39.22419

Source: Authors' Calculation

### 3. ARIMA model

#### Forecasted monthly (average) exchange rate plot using ARIMA with seasonal treatment

#### Forecasting of Exchange Rate of Bangladesh using VAR model

Form VAR monthly average forecasted exchange rate for July, 2012= -4.137+1.389-0.828+0.692+0.016 = -2.868 percent growth over June, 2012 exchange rate (81.820)=79.474 (under-cast comparing actual 81.772 of July,2012 ). VAR analysis and forecasting imply that economy of Bangladesh observing interdependence relationship with co-integrating vector.

### 5. VECM

#### Estimated coefficient of Reserve Money (RM) and inflation and other variables

#### Johansen's Co-integrated Tests

Null Hypothesis	Alternative Hypothesis	Trace Test		Maximum Eigen Value Test	
		Statistics	95% Critical Value	Statistics	95% Critical Value
r=0	r=1	51.70752*	47.85613	25.59641	27.58434
r≤1	r=2	26.11111	29.79707	15.66276	21.13162
r≤2	r=3	10.44835	15.49471	8.740594	14.26460
r≤3	r=4	1.707753	3.841466	1.707753	3.841466

\*(\*\*) denotes rejection of the hypothesis at 5%(1%) level Trace test indicates 1 co-integrating equation;

Max-eigenvalue test indicates no co-integration at the 0.05 level

Source: Authors' Calculation

#### Long run equation:

$$\text{GINFLATION} = 12.09 + 0.36 \text{RM}(-1) - 1.36 \text{INTRATE}(-1) - 0.33 \text{NEERGR}(-1)$$

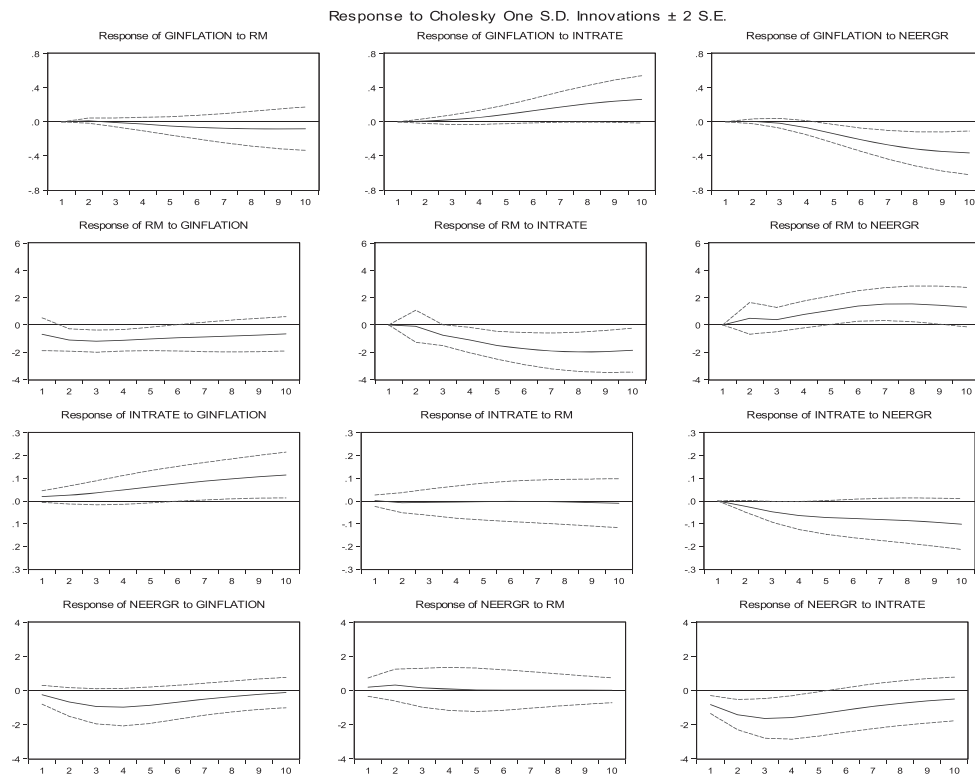
(3.13)                      (0.91)                      (1.66)

#### Impulse Response Function (IRF)

IRF of ginflation to RM band overlap the 0 (mean) line. Where, RM to inflation band did not converge to 0 line. The IRF implies general inflation has more power to impact high powered money. If the inflation raises it will create more RM. Higher currency in circulation of RM contribute more inflation rather higher growth in Deposit Money Banks reserve in RM. Other variables are showing convergence and divergence with respective time period.

Short run equation:

$$\Delta \ln inflation_t = \alpha + \sum_{j=1}^k a_1 \Delta X_{1t-j} + \sum_{j=1}^k a_2 \Delta X_{2t-j} + \sum_{j=1}^k a_3 \Delta X_{3t-j} + \sum_{j=1}^k a_4 \Delta X_{4t-j} + \epsilon_t - k + u_1 t$$



### 6. DSGE model

- Filtering of de-seasonalized logarithmic data with the Hodrick-Prescott (HP) filter or by de-trending
- Determination of priors and potential priors
- Comparing priors and posteriors mean for interest rate increase to curb inflation for example.
- Conditional variance decomposition of the interested variables.

## Indirect Trade Rebuilds Economic Science

MOHAMMAD OSMAN GANI\*

**Abstract:** *A model of indirect trade reveals the essential causal structure of economic reality. This model unifies all of economics with no separation between micro or macro, or trade theory or monetary theory. It incorporates theory of intermediation involving entrepreneurship, transaction cost, and institutions that were never integrated into previous economics. This unified economics is strictly realistic, and is more exact than physics. It delivers certainty and forbids hypothesis and statistical inference. Its theories are logically irrefutable and factually indisputable. It offers clear guidance to economic policy. Economists may at last get what they have been looking for.*

**JEL Classifications**

### 1. Introduction

An increasingly louder chorus of complaints against the mainstream economics denounces it for unrealism of its theories and uselessness in practical problem-solving (See Fullbrook 2006; RWER 2017). A large number of heterodox groups (see) have been desperately trying to find alternatives, but in vain. Here at last is a unified model of all of economics with stunning theoretical realism and practical relevance. It starts with an extremely simple model of indirect trade. It may lead to a more realistic and useful economics.

Bertrand Russell understood how science may make progress. He wrote: “*The point of philosophy is to start with something so simple as not to seem worth stating, but to end with something so paradoxical that no one will believe it.*” (Russell 1918). The model here reveals the obvious facts that were completely ignored. Prevailing economics, mainstream plus the heterodoxy, cultivated the

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\* Associate Professor, Independent University of Bangladesh, E-mail: 52ganiosman@gmail.com

universal ignorance with an obstinate refusal to recognize the obvious facts. Following Russell, the job is to see the obvious.

Seeing the obvious must be extraordinarily difficult for minds focused on irrelevant details. Copernicus demonstrated (see) how to see the obvious with a very simple model of the solar system. Putting the sun at the center, and the earth in its orbit around the sun, and the moon in its orbit around the earth, he explained a wide range of astral phenomena which previous generations could never connect together at all. He explained the great diversity of facts relating to alternation between day and night, change of seasons, the zodiac, the length of the solar year, the phases of the moon, the solar eclipse, the lunar eclipse, and the oceanic ebbs and tides. He dispelled the universal illusion that led people to think that the earth is still while the sun moves around it. The Copernican model shattered a wide range of cultivated ignorance and superstition.

The model of indirect trade in economics does something quite similar to what the Copernican model did for astronomy. Nobody would have believed (See Debreu 1991) that it was possible that a single model would explain everything in economics with a stunningly high degree of realism so that there is no chance of factual dispute, and possibility of logical refutation. The model has zero assumptions and puts an absolute ban on hypothesis mongering. Its conclusions are certain, and beyond room for doubt.

How is this possible? It is possible just the way the Copernican model was possible. So here it goes.

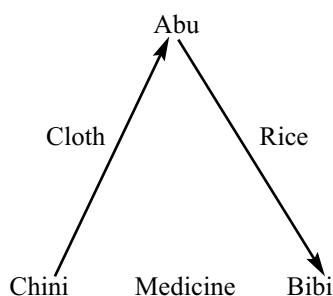


Figure 1: Permanent and Universal Unemployment

The story is pretty simple. Agent Abu has 25 kg of rice to sell at 40 taka/kg, and agent Bibi is eager to buy the same at the quoted price to satisfy her hunger for food. Bibi has 50 capsules of medicine to sell at 20 taka/capsule while Chini is deadly serious to buy the same at the quoted price to treat her sickness. And Chini

has a lungi-punjabi set to sell for 1000 taka/set and Abu is desperate to buy the same at the quoted price to cover his nakedness. Every object has demand equal to supply and every agent has income equal to expenditure. Everybody would expect that this trade will take place because demand is equal to supply and income is equal to expenditure. But none of these goods will be traded ever, unless there is money to allow it. This is the supreme paradox.

This model destroys all of rational choice based microeconomics, macroeconomics, trade theory, monetary theory, and welfare theory. This is just as the Copernican model destroyed the entire range of theories regarding everything that the model explained. The abysmal darkness of ignorance is completely removed by the bright light of science, without any shade of doubt, and without any room for dispute. It leads to an economics so completely new that practically nothing of old economics survives.

The new economics is a unified theory of the economy governed by three institutional rules of exchange. A single equation of reciprocal equivalence operates at four regimes of exchange in three dimensions to cover all issues of economics in a unified model.

## **2. Theory of unemployment**

Figure-1 is a depiction of a potential indirect trade that does not become effective and hence gives rise to permanent and universal unemployment of all factors of production, making trade of all products impossible. Yet demand is equal to supply for each product at the equilibrium price, and ex ante income is equal to ex ante expenditure for each agent who wants to sell something worth 1000 taka to buy something else worth 1000 taka. But no trade is possible unless there is money.

Why? There is a universal institutional law of exchange that says that the buyer must pay the seller and nobody else, and the seller must get a payment from the buyer and from nobody else. This is the law of reciprocity. Abu cannot sell the rice to Bibi, because Bibi can offer medicine that Abu does not want; and Abu wants cloth that Bibi cannot deliver. There is no double coincidence between the objects (Rice, medicine) and no reciprocity between agents (Abu, Bibi). Similarly for every other pair of goods. No barter is possible for lack of double coincidence.

There is no possibility of intertemporal trade with bond. Bond is possible if an agent has a current surplus to lend or deficit to borrow. Since income is equal to expenditure, there is no budget imbalance and no question of debt and credit financing of the purchases.

Lastly, there is no subsistence or autarky. Naked Abu needs cloth, but produces rice that he will not eat (but will give up against the cloth). He does this because he defeats optimal choice in order to become an enterprising human above the rational animals. Optimally, a rational animal produces what he wants to consume, and the production occurs at the lowest marginal cost. But an enterprising human can do much better. He can abort the production of what he wants to consume, because he can find a stranger who will give it to him at a purchase price much lower the consumer's minimum cost of production. Abu wants to trade because he makes gains from trade. He cannot substitute the production of rice in favor of cloth, because he will get very little cloth compared to what he could get by exchanging the rice for the cloth from Chini.

Among four possible regimes of trade, the model has ruled out autarky (subsistence, no trade), direct trade, and intertemporal trade. The only remaining option is indirect trade. That can occur only with money and with nothing else. It means that money is necessary to allow indirect trade. Without money, no indirect trade is possible. And necessity of money means non-neutrality of money. Money cannot fail to affect the goods that must be paid for with nothing but money.

Sufficiency of money is easily proved. If Abu happens to have 1000 taka in money, he can give it to Chini and get the cloth. Chini can give this money to Bibi to get the medicine, which she could never get by giving cloth to hungry Bibi who wanted to eat rice and never wished to eat cloth. And Bibi could give the money to Abu to buy the food that she could never buy against medicine as Abu could not cover his shame with medicine rather than cloth. So if there is money, indirect trade occurs.

This theory of unemployment destroys classical economics beyond redemption. The classics claimed that if demand is equal to supply, trade takes place (see). This is clearly false. Equality of demand and supply is a necessary condition of trade, but certainly not sufficient.

Keynesian macroeconomics (see ) has been finished. Keynes claimed that if income is equal to expenditure, there is full employment (See ). The model shows that this is false. There is nothing in macroeconomics that survives this demolition.

What Keynes did not see is that the equality of income and expenditure in the aggregate fulfills equivalence but does not fulfill reciprocity. Abu has the rice of the correct value to buy the cloth: he has the ability to buy. But rice is not the correct kind of good to pay for cloth, medicine is. So Abu lacks the ability to pay.



The potential aggregate expenditure in terms of real goods gives the ability to buy. Money converts this into ability to pay, by fulfilling the reciprocity requirement. Abu can pay for the cloth only with money and with nothing else. Money has nothing to do with storing value except by perverse accident. Bonds and assets store value, not money.

Along with all of macroeconomics, all of trade theory is also finished. Prevailing economics never saw that the four regimes of trade are mutually exclusive. Indirect trade can occur if no other form of trade is possible. If direct trade is possible, money is impossible. No economist ever built a formal model of indirect trade (but see Mises 1949 for a chapter on indirect exchange), because there was no proper model of trade at all. Ricardo (1934) did provide half a theory of trade (failing to consider the matter of preference order, and of payment, and of intermediation), which Samuelson sabotaged down into a model of allocation (See Gani 1995).

### 3. Indirection with transfer of value

Indirect trade has indirectness. It involves a great audacity of the human, that one stranger is able to meet the obligation of an unknown stranger through delivery of a real good without getting a real good. Thus Chini gives the cloth to Abu on behalf of Bibi even as Chini is a stranger to Bibi, and Chini gets no real good from Abu. Bibi has an obligation to pay Abu in real terms with a real good worth 1000 taka against her receipt of the rice worth 1000 taka. But Abu does not want medicine, but wants cloth, and Chini gives the cloth. That is why the trade is indirect.

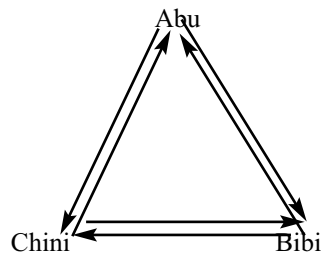


Figure-2: Money transfers value to allow indirect trade

This is possible because money is the device to transfer claims and obligations between perfect strangers. Abu earns a claim on Bibi worth 1000 taka against the food he gives to Bibi. He can of course take medicine that Bibi sells, but he wants to transfer his claim from medicine to cloth, transferring it from Bibi to Chini. To

do this, he takes money rather than medicine from Bibi. Again, Abu has an obligation to Chini against the cloth he gets from Chini. But he transfers his obligation by giving the rice to Bibi rather than to Chini. To discharge his obligation to Chini, he gives money rather than food to Chini. Thus money is a device to transfer value, which is the transfer of claims and obligations of specified value of real goods. Money is not a real good, but a container of claims. As such, it requires a social proof of claim, and need have no physical existence at all.

To serve as money, the instrument must first discharge claims and then discharge obligations. So that it must be bought (earned) against sale of real good but must not be consumed: it must be sold (spent) again to exercise claims on other real goods. Money therefore cannot produced or consumed by one who uses it as a device first to redeem claims and then to redeem obligations. It is a tool to manage claims and obligations.

All previous theories of money are now dismissed wholesale. No theory that fails to recognize the transfer of claims and obligation with money can stand.

#### 4. Relation between real goods and money

The model of indirect trade makes it crystal clear why money appears in indirect trade: it is a device necessary to create the indirectness of indirect trade. It is related to the indirectly traded real good as its payment.

To formalize the matter, let  $q_{AB}$  denote the quantity of a traded good sold by agent A and bought by agent B. Multiply this by the price  $p_{AB}$  to get the value of the good  $v_{AB}=p_{AB} * q_{AB}$ . Equivalence with the other good  $q_{CA}$  that agent A buys means  $v_{AB}=v_{CA}$ . But reciprocity requires that the subscript orders must be precisely opposite. Between A and B, reciprocity requires  $v_{AB}=v_{BA}$ , not fulfilled by  $v_{AB}=v_{CA}$ , because if B is the buyer, the payment cannot be made by C who is not B. If Bibi buys the food, Chini cannot pay for it by giving the cloth. Bibi must pay Abu. And if Chini gives the cloth to Abu, Abu must pay Chini and not give the payment to Bibi.

Let  $m$  denote money. Then the two step process is given as  $\{(v_{AB} = m_{BA}):: (m_{AC} = v_{CA})\}$ .

Money enters in between the two goods to create artificial reciprocity. Abu gives rice to Bibi, and Bibi gives money to Abu. Then Abu gives money to Chini who gives cloth to Abu. Money serves as a means of payment to settle claims and obligations. Anything that settles claims and obligations is a Means of Payment

(MOP) and money is a MOP. It is of course an artifice, but it is the most commonly traded object.

Previous economics never understood the relation between real goods and money. Walras Law and ISLAM analysis utterly failed to make sense of the relation. The model of indirect trade reveals the transfer of value and rebuilds monetary theory afresh by linking money to real goods.

Without any clue to how money is related to real goods, previous economics never defined the equilibrium quantity of money for a specified basket of indirectly traded goods. The new model delivers it with devastating clarity to demolish old monetary theories of all stripes and colors. The cited example of indirect trade is easily presented as the following matrices.

$$\begin{pmatrix} 0 & v_{AB} & 0 \\ 0 & 0 & v_{BC} \\ v_{CA} & 0 & 0 \end{pmatrix} + \begin{pmatrix} 0 & 0 & m_{AC} \\ m_{BA} & 0 & 0 \\ 0 & m_{CB} & 0 \end{pmatrix} = \begin{pmatrix} 0 & v_{AB} & m_{AC} \\ m_{BA} & 0 & v_{BC} \\ v_{CA} & m_{CB} & 0 \end{pmatrix}$$

Goods Matrix W
Money Matrix K
Goods-Money Matrix C

The equation of reciprocal equivalence gives  $M=PQ$  where  $M$  is the sum of money in the Money Matrix  $K$ , and  $PQ$  is the sum of values of the real goods in the Goods Matrix  $W$ .  $M$  is the equilibrium quantity of money corresponding to the specified basket of indirectly traded goods. The equation  $M=PQ$  implies that the sum of price elasticity of money and output elasticity of money is equal to one:  $[(dP/dM)*(M/P) + (dQ/dM)*(M/Q)] = 1$ . This is a direct demolition of classical quantity theory of money, Lucasian rational expectation model, Friedman’s monetarism and Keynesian theory of money. It is strictly empirical.

The policy guidance is obvious. Maintain the supply of money at equilibrium quantity to avoid both inflation and unemployment at once. If actual supply of money exceeds the equilibrium quantity, there is inevitable unnecessary inflation and its many evils. If the actual supply falls short of the equilibrium quantity, there is inevitable unemployment that is wholly unacceptable and unnecessary.

### 5. Choice Theory

The root of the failure of the mainstream is the failed theory of rational choice. Rational choice applies to all animals subsisting in the natural ecology, but does not apply to human beings, because they defeat it by pursuing entrepreneurial choice.

Exchange is an unnatural phenomenon that defies the natural law of subsistence. Natural law allows the strong predator and the cannibal to hunt down the weak prey, kill and eat it without payment. Alert humans carried a long and hard struggle over thousands of years to put up a resistance against plunder. They imposed the laws of equivalence and reciprocity to govern exchange.

In addition to governing the relation between objects by the law of equivalence, and relation between agents by the law of reciprocity, society installed a third law to govern the relation between agents and objects. This is the law of freedom enterprise. This is where rational choice is defeated and the classical ideology of free enterprise is upgraded into theory.

An agent incurs a cost of production or purchase to get the good, and derives benefit from its consumption or sale. The difference between the benefit and the cost is welfare improvement. Hence the agent to object relation is a relation of welfare. Microeconomics knows nothing of it, and is summarily dismissed. Micro makes seller's price equal to marginal cost, making welfare gain zero. The buyer's price is made equal to marginal benefit (marginal utility in units of money), making welfare gain zero. In reality, the seller's price is higher than the seller's marginal cost of production, and the buyer's price is above the seller's price because the merchant adds a mark up. The buyer's price is below the marginal cost of production incurred by the buyer (who actually aborts production just because of this high marginal cost of production). Neoclassical price theory cannot stand anymore.

The problem of exchange is that the same object has two agents associated with it, one as its seller and the other as its buyer. The paradox is that the seller produces it but does not consume it, while the buyer consumes it but does not produce it. The explanation lies in the welfare aspect, in the difference between the benefit and the cost.

As a rational animal, Crusoe would allocate his resources, summarily called labor, to produce apples and bananas such that the marginal cost of bananas in terms of apples will be the minimum. But if Crusoe has a chance to become human, he may find Defoe from the next island, and buy bananas from Defoe at a price much lower than Crusoe's minimum marginal cost, just because Defoe can produce bananas at a much lower cost than Crusoe. Hence Crusoe will abort the production of bananas and resort to buying them. This is an act of defiance of natural law of subsistence and defeats optimal choice.

The choice in the exchange between natural enemies Crusoe and Defoe defeats natural law. Crusoe as a hunting animal would naturally kill Defoe and take over

his bananas. But Defoe will fight back and wish to kill Crusoe too. By virtue of superior intelligence called alertness, Crusoe and Defoe may discover that it is cheaper to buy than plunder and bear the high cost of resistance including life and limbs. To engage in exchange, they have to defy natural law and institute social laws.

There are three social laws governing three relations in every instance of exchange. The first law governs the object to object relation of value by the rule of equivalence: two objects that mutually pay for each other must be of equal value. The second law governs the agent to agent relation of payment by the rule of reciprocity: the buyer has an obligation to pay the seller individually and pay nobody else, and the seller earns a claim for payment on the buyer individually and on nobody else.

The third law governs the agent to object relation of welfare by the rule of freedom of enterprise. An agent incurs a cost to produce or purchase the good and is free to produce or purchase it. And agent derives benefit from the object by consuming it or by selling it in favor of something else. The agent has a freedom to consume or sell the object. These two freedoms combine to create the freedom of intermediation: an agent may buy something rather than produce it, and then sell it rather than consume it.

The agents exercise the freedom of enterprise to achieve welfare gains that materially take the form of pure profit. The welfare relation dictates who will produce and sell (but not consume) the good, and who else will purchase (but not produce) and consume it. Who will sell depends on the performance order based on marginal cost. Thus if A incurs a lower marginal cost than B in the production of x, A will produce x and B will abort production. The same consideration makes it gainful for B to produce y and sell it.

Who will buy what is governed by the preference order defined by marginal benefit. If A gets a higher marginal benefit than B from y, then A will buy y. In the same manner, B will buy x because he derives higher marginal benefit from x than A does.

Rational choice gets the whack here because it can make no sense of comparing the marginal cost of x (that A produces) to the marginal benefit of y (that A consumes). It is unable to understand the gains from trade being the marginal benefit of y minus the marginal cost of x (that pays for y).

Rational choice sees the world from the viewpoint of one agent and hence is inherently incapable of seeing the performance order and the preference order

between different agents over the same pair of goods. Most tellingly, it is absolutely unable to understand that trade requires absolutely intransitive preference order: for A to sell x and buy y, and for B to sell y and buy x, it is necessary that A prefers y to x while B must have precisely the opposite order of preference, namely B must prefer x to y. Rational choice can make no sense of x being referred to y at the same time as y being preferred to x in the same exchange. Rational choice must be fully thrown away to make any sense of trade.

The kind of choice that makes sense of exchange is entrepreneurial choice. It is better to call it consistent choice to keep focus on the requirement that every instance of exchange must obey the three rules of exchange. The choice must be consistent with those rules. Rule consistency of social choice allows goal consistency of individual choice. Goal consistency has been studied to death by rational choice: the rational agent has a goal to minimize cost and maximize benefit.

Rational choice has nothing to explain in economics, but something to explain in biology. In the ecology, all animals obey the natural law of subsistence, which imposes the budget constraint and compels animals to minimize cost of production. That automatically means maximizing output value per unit of cost. But the ecology belongs to biology, not to economics.

An economy stands out of the ecology by defying the natural law of subsistence (optimal choice) by installing social laws of exchange. The repudiation of natural law occurs by disintegration of livelihood: the producer is not the consumer and by the unnatural integration of natural enemies. In the ecology, strangers kill and eat each other rather than produce for each other.

The intransitivity of social choice hides the most paradoxical matter of conflict avoidance and promotion of welfare between natural enemies. This intransitivity makes society possible. This is a truth so far out of reach of Ken Arrow and his followers that they must stop.

Intransitivity literally means reciprocity: if one gives, one must also take and vice-versa. Transitivity means a one-way journey of the predator: take (kill) but do not give (get killed), or give (get killed) but do not take (kill). 'Make a transit and do not come back' is the mantra of the jungle. Do not go away (with what you have taken), but do come back (to give what you are to pay) is the mantra of society. Both giving and taking is human. Only animals fail to do both giving and taking: they can do only one.

One single model of indirect trade explains everything in economics. Really nothing of old economics survives, except when wrong approaches led to the right destination by accident. Thus Keynes used invalid logic to reach a valid conclusion by a lucky accident: if there is financial repression evidenced in widespread unemployment, inject more money into circulation to restore employment. Certain bits of old economics survive as accidental survivors. When someone builds a skyscraper in place of horrifying cottage, the roof of the cottage may indeed survive as the new broom to mop the floor.





## Financial Development and Economic Growth in Bangladesh and India: Evidence from Cointegration and Causality Tests

MD. ZAHIRUL ISLAM SIKDER\*

MD. ABDUL WADUD\*\*

MD. ABU HASAN\*\*\*

**Abstract:** *The relationship between financial development and economic growth has been the subject of increasing attention over the 21st century. This study is basically an econometric analysis of financial development and economic growth in Bangladesh and India involving time series data of GDP, domestic credit provided by financial sector, domestic credit to private sector, and broad money from 1974 to 2015. This study employs Johansen's multivariate cointegration procedure to test the long run relationship. In addition, vector error correction model is used to test the causal relationship between financial development and economic growth. To test the stationarity properties of the variables we use ADF and PP unit root tests and find that the variables are stationary in their difference form. Johansen's cointegration test reveals the presence of long term relationship between financial development and economic growth in Bangladesh and India. Results of ECM provide the evidence of bidirectional causal relationship between financial development and economic growth in both countries. Thus, right and effective monetary policy is very important to accelerate economic growth as both supply-leading and demand-following hypotheses are effective in Bangladesh and India.*

**Key Words:** *Financial development; Economic Growth; Cointegration; VECM*

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\* Founder Principal, Dhaka City International College, Dhaka, Bangladesh

\*\* Professor, Department of Economics, University of Rajshahi, Bangladesh

\*\*\* Assistant Professor of Economics, BCS (General Education), Bangladesh

## 1. Introduction

Financial development and economic growth are two most important components for economic development. These two components play vice versa causal role to buildup economic development. There are still old argument concerning the direction of causality between financial development and economic growth to the power of influence and the way of financial factors impact. In recent years, the relationship between financial development and economic growth has become an issue of extensive analysis. The theoretical relationship between financial development and economic growth goes back to the study of Schumpeter (1911) who identified on the services provided by financial intermediaries and argues that these are essential for innovation and development. Patrick (1966) identifies two possible directions of causality between financial development and economic growth. These relationships are labeled as the supply-leading and demand-following hypothesis. The demand-following view postulates a causal relationship from economic growth to financial development. In contrast, the supply-leading view postulates a positive impact of financial development on economic growth, which means that creation of financial institutions and markets increases the supply of financial services and thus leads to economic growth.

The relationship between the financial development and economic growth is important for economic development in Bangladesh and India. Bangladesh and India experience an average rate of 4.76% and 5.86% GDP growth rate respectively over the period from 1974 to 2015 (World Bank, 2016). The trend of financial development indicators also conclusively implies that Bangladesh and India and are performed well over the 42 years from 1974 to 2015 relative to other countries in this region. Though India has experienced higher average rate of growth in GDP and financial development from 1974 to 2015, Bangladesh is performing better than any other South Asian countries from 1990s. The above growth scenario motivates us to find the cointegrating and casual relationship between financial development and economic growth of Bangladesh and India. The specific objectives of this research are as follows:

- i. To investigate the short-run and long-run relationship between various indicators of financial development and economic growth;
- ii. To assess the causality and direction of causality between indicators of financial development and economic growth.

This research is organized as follows: section 2 reviews the literatures; data and methodology are provided in section 3; section 4 presents the empirical findings, and finally, section 5 concludes the study.

## 2.1 Literature Review

The relationship between financial development and economic growth has been the subject of growing attention over the past few decades. **Goldsmith (1969)** empirically shows the existence of a positive relationship between financial development and GDP per capita. **Levine et al. (2000)** find that the development of financial intermediation affects growth positively, and that cross-countries differences in legal and accounting system largely account for different degrees of financial development. **Rahman (2004)** investigates the association between financial development and economic growth in case of Bangladesh over the period of 1976-2005. Applying the structural VAR approach, he reports that financial development supports investment which increases economic growth. This confirms the validity of supply side hypothesis in Bangladesh. **Ang and McKibbin (2005)** examine the causal relationship between financial development and economic growth in Malaysia using time series data from 1960 to 2001. The ratio of liquid liabilities (or M3) to nominal GDP, commercial bank assets to commercial bank plus central bank assets, and ratio of domestic credit to private sector to nominal GDP are used to construct an index as a proxy for financial depth using principal components analysis. The findings suggest that growth exerts a positive and unidirectional causal effect on finance in the long-run. **Khan et al. (2005)** investigates the link between financial development and economic growth in Pakistan over the period 1971-2004. The study shows a positive impact of real deposit rate on economic growth. The authors recommend that policy makers should focus attention on long run policies to promote economic growth. **Guryay et al. (2007)** examine the link and causal relationship between financial development and economic growth on Northern Cyprus. Applying the tool of Ordinary Least Squares (OLS), the authors utilize time series data for 18 years, covering the periods of 1986-2004. Their findings reveal an insignificant positive relationship between financial development and economic growth. Another important finding worthy of reporting has to do with the direction of the causality between the two variables. Results from this test reveal that the causality runs from economic growth to financial development. **Sanusi and Salleh (2007)** examine the relationship between financial development and economic growth in Malaysia covering the period 1960-2002. Three measures of financial development are used, namely, Broad Money to GDP, Domestic Credit Provided by the Banking System, and Domestic Credit to Private Sector to GDP. By employing the autoregressive distributed lag approach, the study finds that ratio of broad money to GDP, and credit provided by the banking system have positive and statistically significant impact on economic growth in the long run. The

results further indicate that a rise in investment enhances economic growth in the long run. **Pradhan (2009)** examines the long run and short run dynamics between financial development and economic growth using time series data over the period 1993-2008 in India. Applying the Johansen cointegration test, which confirms the existence of cointegration, the author declares a positive long run relationship between financial development and economic growth. The Granger causality test confirms the interdependence between financial development and economic growth in India. Considering this bidirectional relationship, the researcher documents that the effect of financial development must be considered as a policy variable necessary to stimulate economic growth and vice versa. One notable weakness of this study is the use of industrial production which is not really a sufficient proxy for economic growth. **Chakranorty (2010)** investigates the finance-growth nexus in India using different indicators of financial development and reports that stock market capitalization (financial development indicator) adds in economic growth. Using rolling regression, **Hye (2011)** investigates the relationship between financial development and economic growth in case of India over the period of 1973-2008. He notes that financial development impedes economic growth. **Hye and Islam (2013)** investigate the relationship between financial development and economic growth in Bangladesh using time series data over the period of 1975-2009. The ARDL bounds testing approach to cointegration is applied to test whether cointegration between variables exists. They find that the variables are cointegrated in the long run and financial development impedes economic growth.

We find that researchers' use different indicators of financial development and different studies use different econometric techniques. Empirical results are found mixed, so this is basically an issue of empirical investigation. So far our knowledge goes there are no studies explore this issue combindly for Bangladesh and India using cointegration and error correction modeling approach.

### **3. Data and Methodology**

#### **3.1 Data and Data Description**

The study uses time series data of real GDP growth rate, Domestic Credit provided by the Financial Sector (as % of GDP) – DCBS, Domestic Credit provided by the Private Sector (as % of GDP) – DCPS, and M2 as Broad Money covering the period from 1974 to 2015. The data of real GDP growth is used as dependent variable and as proxy for economic growth. Data of DCBS (as % of GDP), DCPS (% of GDP), and M2 (as % of GDP) are used as independent variable and as

indexes of financial development. These data are collected from World Development Indicators (WDI)-2016 of the World Bank.

Figure 1 shows the trends of GDP growth rate of Bangladesh and India. GDP growth rate of Bangladesh falls from 9.56 per cent in 1974 to -4.09 in 1975. This is perhaps because of the effect of famine, heavy rainfall, massive flooding in 1974. The GDP growth has started increasing sharply and reached 5.66 percent in 1976. Till 1990 from 1984 there was a remarkable ups and downs in GDP growth rate. After that till 2004 the growth rate was fluctuating slowly with an average rate of growth rate of around 5.00 per cent. In 2007 the GDP growth rate reaches a peak at 6.4 per cent. After 2011 the GDP growth rate was almost stable. GDP growth rate of Bangladesh is an upward positive trends till 2015. **India has performed with an average 5.85 percent annual growth over the 42 years.** GDP growth rate of India was -5.24 percent in 1979 as agricultural production in 1976-77 is declined at 6%, production of commercial crops, foods, industrial

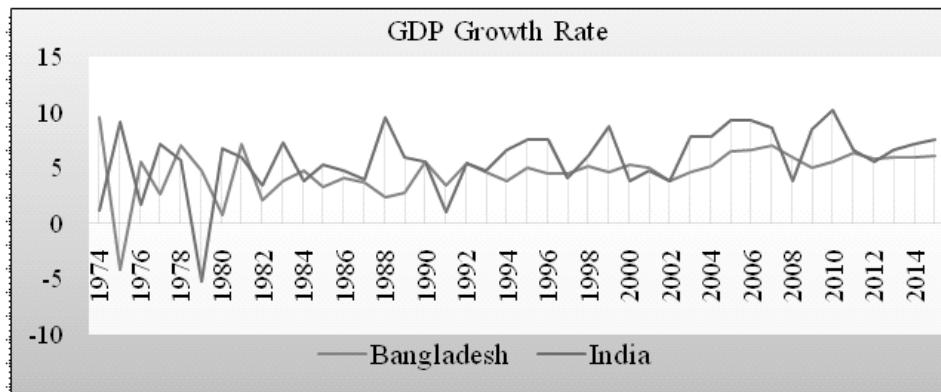


Figure 1: GDP Growth Rate of Bangladesh and India

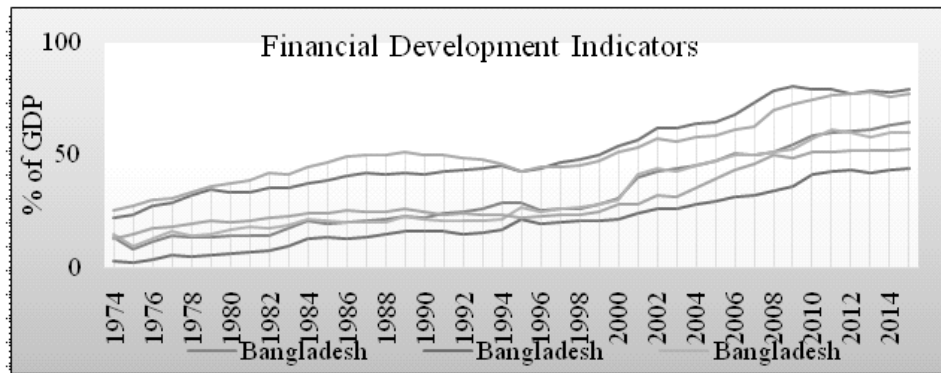


Figure 2: Financial Development Indicators Growth Rate of Bangladesh and India

production was low at an average rate of 10.5%. From 1980s, beginning of every decade India has launched a new set of economic reforms targeting different set of aspects of the economy and as a result, India India has experienced higher average rate of growth than Bangladesh over the years.

Figure 2 shows financial development indicators growth rate of Bangladesh and India. Trends of M2, DCPS and DCBS as percentage of GDP conclusively suggest that the growth rates gradually rise over time from 1974 to 2015 in Bangladesh and India. Average rates of growth of M2 in Bangladesh and India is 32.09% and 50.75% respectively, while DCPS of Bangladesh and India grow with 20.30% and 30.14% respectively over the 42 years. India also provides more DCPS over years relative to Bangladesh.

### 3.2 Methodology

There are many distinct methodologies developed in recent years for econometric analysis of time series data. In this section, the dynamic relationships between financial development and economic growth are modelled through relevant econometric modeling, such as, unit root tests, Johansen cointegration test and vector error correction mechanism.

#### 3.2.1 Unit Root Test

A test of stationarity or non-stationarity that has become widely popular over the past several years is the unit root test. There are several unit root tests to examine stationarity of the time series. The first unit root test that was introduced in econometrics by Dickey and Fuller (1979). In statistics, the Dickey–Fuller (DF) test examines the null hypothesis of whether a unit root is present in an autoregressive model. The alternative hypothesis is different depending on which version of the test is used, but is usually stationarity or trend-stationarity. The Dickey Fuller test is based on linear regression. Serial correlation can be an issue, in which case the Augmented Dickey-Fuller (ADF) test can be used. The most famous test is the augmented Dickey–Fuller test (ADF). Another test is the Phillips–Perron (PP) test. Both these tests use the existence of a unit root as the null hypothesis. ADF and PP test are used in this study to fulfill the precondition of cointegration analysis for the data series of the variables.

Dickey and Fuller (1981) have developed an augmented version of DF test, known as the Augmented Dickey Fuller (ADF). This test is conducted augmenting the preceding three equations by adding the lagged values of the variable. To be specific, Augmented Dickey Fuller (ADF) unit root test is based on the following regression equations.

$$\Delta Y_t = \gamma Y_{t-1} + \delta_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \text{ (no trend, no intercept)} \quad (1)$$

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + \delta_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \text{ (intercept only)} \quad (2)$$

$$\Delta Y_t = \alpha + \beta T + \gamma Y_{t-1} + \delta_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \text{ (trend and intercept)} \quad (3)$$

where  $\alpha$  is a intercept (constant),  $\beta$  is the coefficient of time trend  $T$ ,  $\gamma$  and  $\delta$  are the parameters where,  $\gamma = \rho - I$ ,  $\Delta Y_t$  is the first difference of  $Y_t$  series,  $m$  is the number of lagged first-differenced term, and  $\varepsilon_t$  is the error term.

The test for a unit root is conducted on the coefficient of  $Y_{t-1}$  in the regression. If the 't' statistic is less than the critical 't' values, the null hypothesis of a unit root cannot be rejected for the time series and hence, one can conclude that the time series is non-stationary at their levels.

This study also uses Phillips-Perron (PP) unit root test due to the some drawbacks of the ADF Test. Phillips-Perron (1988) develops a non-parametric unit root test. The PP test is modified from DF test so that serial correlation does no longer affect their asymptotic distribution. Whilst the ADF test addresses lags of  $\Delta Y$  as regressors in the test equation, the PP test makes a non-parametric correction to the t-test statistic. The PP tests correct for any serial correlation and heteroscedasticity in the errors  $\varepsilon_t$  of the test regression by directly modifying the test statistic.

### 3.2.2 Test of Cointegration

In economics, cointegration is most often associated with economic theories that imply equilibrium relationships between time series variables. Finance-Growth theory implies cointegration between GDP growth and financial development indicators. The equilibrium relationships implied by these theories are referred to as long-run equilibrium relationships, because the GDP growth and financial development indicators that act in response to deviations from equilibrium may take a long time to restore equilibrium. As a result, cointegration is modeled using long spans of low frequency time series data measured monthly, quarterly or annually. Once variables have been classified as integrated of order  $I(0)$ ,  $I(1)$ ,  $I(2)$  etc., it is possible to set up models that lead to stationary relations among the variables, and where standard inference is possible. The necessary criteria for stationarity among non-stationary variables are called cointegration.

Two formal approaches are commonly employed to observe the presence of cointegration among included series in the model. These approaches are the augmented Dickey-Fuller residual-based test approach proposed by Engle and Granger (1987) and the Johansen's Full Information Maximum Likelihood (FIML) approach (Johansen and Juselius, 1990). We apply Johansen's multivariate cointegration procedure to test the long run relationship. Johansen's multivariate cointegration test is based on VAR model. Gujrati (2007) argues that 'according to Sims, if there is true simultaneity among a set of variables, they should all be treated on an equal footing; there should not be any a priori distinction between endogenous and exogenous variables. It is in this spirit that Sims developed his VAR model'.

Johansen methods allow us to determination of the number of cointegrating vector. These tests directly investigate the integration in VAR model. Johansen and Juselius approach based on VAR model can be expressed mathematically as:

$$Y_t = \alpha + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (4)$$

where  $Y_t$  is a vector containing  $n$  variables of  $I(1)$  at time  $t$ ,  $\alpha$  is an  $(n \times 1)$  vector of constants,  $A_p$  is an  $(n \times n)$  matrix of coefficients,  $p$  is the maximum lag included in the model and  $\varepsilon_t$  is an  $(n \times 1)$  vector of error terms. As in Enders (2004), Equation (4) can be written in the form of the error correction model assuming cointegration of order  $p$  as:

$$\Delta Y_t = \alpha + (A_1 - I)Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (5)$$

or in a final broad form as:

$$\Delta Y_t = \alpha + \Gamma_1 \Delta Y_{t-1} + \dots + \Gamma_{p-1} \Delta Y_{t-p+1} + \Pi Y_{t-p} + \varepsilon_t \quad (6)$$

Where,  $\Gamma_i = (A_1 + A_2 + \dots + A_{p-i} - I)$  represents the dynamics of the model in the short run. In Equation (5.21),  $\Pi = (A_1 + A_2 + \dots + A_p - I)$  represents the long run relationship among the variables included in the vector  $Y_t$ , and  $I$  is the identity vector. The key idea of the Johansen and Juselius approach is to determine the rank of the matrix  $\Pi$ , which represents the number of independent cointegration relationship.

Johansen (1988) suggests two test statistics named trace and eigenvalue test statistic for estimating the number of cointegrating vectors or equations. According to the Trace test, the null hypothesis ( $H_0$ ) is that the number of distinct cointegrating vector is less than or equal to  $r$  against the alternative hypothesis of more than  $r$  cointegrating vectors. The trace statistic is computed from the following equation:



$$\lambda_{trace}(r) = -T \sum_{i=r+1}^n \ln(1 - \lambda_i) \tag{7}$$

According to the maximum eigenvalue test, the null hypothesis ( $H_0$ ) is that the number of cointegrating vectors is  $r$ , against an alternative of  $(r+1)$  vectors. The maximum eigenvalue statistics is computed as:

$$\lambda_{max}(r, r + 1) = -T \ln(1 - \lambda_{r+1}) \tag{8}$$

Where,  $\lambda_i$  denotes the estimated values of the characteristic roots obtained from the estimated;  $T$  is the number of observations. In order to perform the Johansen cointegration test, the first step is to calculate the trace and maximum eigenvalue statistics then compare these to the appropriate critical values.

### 3.3.3 Error Correction Model (ECM)

Having verified if the variables under study (GDP, DCBS, DCPS and M2) are cointegrated, vector error correction model can be formulated to determine the direction of causality among the variables in case of Bangladesh and India. According to Granger representation theorem, the relationship among GDP, DCBS, DCPS and M2 can be expressed in the error correction mechanism as follows:

$$\Delta GDP_{i,t} = \alpha_1 + \sum_{i=1}^{\rho} \alpha_i \Delta GDP_{t-i} + \sum_{j=1}^{\rho} \alpha_j \Delta DCBS_{t-j} + \sum_{k=1}^{\rho} \alpha_k \Delta DCPS_{t-k} + \sum_{s=1}^{\rho} \alpha_s \Delta M2_{t-s} + \theta_1 ECT_{t-1} + \varepsilon_i \tag{9}$$

$$\Delta DCBS_{i,t} = \beta_1 + \sum_{i=1}^{\rho} \beta_i \Delta GDP_{t-i} + \sum_{j=1}^{\rho} \beta_j \Delta DCBS_{t-j} + \sum_{k=1}^{\rho} \beta_k \Delta DCPS_{t-k} + \sum_{s=1}^{\rho} \beta_s \Delta M2_{t-s} + \theta_2 ECT_{t-1} + \varepsilon_i \tag{10}$$

$$\Delta DCPS_{i,t} = \gamma_1 + \sum_{i=1}^{\rho} \gamma_i \Delta GDP_{t-i} + \sum_{j=1}^{\rho} \gamma_j \Delta DCBS_{t-j} + \sum_{k=1}^{\rho} \gamma_k \Delta DCPS_{t-k} + \sum_{s=1}^{\rho} \gamma_s \Delta M2_{t-s} + \theta_3 ECT_{t-1} + \varepsilon_i \tag{11}$$

$$\Delta M2_{i,t} = \delta_1 + \sum_{i=1}^{\rho} \delta_i \Delta GDP_{t-i} + \sum_{j=1}^{\rho} \delta_j \Delta DCBS_{t-j} + \sum_{k=1}^{\rho} \delta_k \Delta DCPS_{t-k} + \sum_{s=1}^{\rho} \delta_s \Delta M2_{t-s} + \theta_4 ECT_{t-1} + \varepsilon_i \tag{12}$$

Where, difference operator is indicated by  $\Delta$  while ECT shows residual or error correction term resulted from long run cointegrating equation represents the deviation from the equilibrium in time period  $t$ ,  $(-1 < \theta < 0)$ . The short run parameter represents the response of dependent variable in each period starts from equilibrium. The constant terms are denoted by  $\alpha_i, \beta_j, \gamma_l$  and  $\delta_l$  in VECM equations and the residual terms  $\varepsilon_i$  ( $i=1, 2, 3, 4$ ) is assumed to be normally distributed.

The difference from Granger causality test of VAR model is that, in this case, we can test for different type of causality. While applying t-test of the error correction term, we can observe the results about long run causality. The second test for joint significance of the lagged variables indicates the short run causality. And finally the t-test for joint significance of both the lagged variables and the error correction term shows if this causality is strong or not.

#### **4. Empirical Results**

This section gives the empirical results of the study. It starts with presenting the results of unit root test to check the stationary properties of the data. Then, results of cointegration are presented to show the long run relationship between economic growth and index of financial development. Finally results of ECM based causality are given to show the causal relationship between financial development and economic growth in Bangladesh and India.

Financial systems vary across different countries, but in different countries these financial institutions play different roles. Some countries have the market based financial system; others have the financial system that is oriented to the financial institutions. The country selection in this research is based on different forms of financial system. There are no generally adopted rules for defining the bank-based and the market-based financial system. In this case, it is necessary to provide measures, which can partly show the form of the financial system.

##### **4.1 Results of Unit Root Tests**

We perform ADF and PP unit root tests on all four series in levels and first differences in order to determine the univariate properties of the data employed in the analysis. To investigate the stationary properties of the variables we run the regression analysis with an intercept term, and with intercept and trend term, and none. ADF unit root results of Bangladesh and India are presented in Table 1 to 2 respectively.

It is clear from Table 1 and 2 that all of the variables are nonstationary in their level forms with all three terms as the calculated ADF statistics are smaller than the critical values except for GDP with intercept, and with intercept and trend forms. But, GDP of Bangladesh and India are also non-stationary in level without intercept and trend term as the calculated values are smaller (in absolute form) than the critical values. Results reveal that all the variables are stationary in their first difference form with intercept, and with intercept and trend, and without intercept and trend at 1% level of significance. Results also show that first

*Table 1: Results of ADF Unit Root Test for Bangladesh*

	Levels			First Differences		
	Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
GDP	-8.7811 (0.00)	-13.5468 (0.00)	0.2649 (0.76)	-8.3093 (0.00)	-8.2160 (0.00)	-8.3130 (0.00)
M2	1.12207 (0.99)	-2.0615 (0.55)	3.6832 (0.99)	-6.1552 (0.00)	-6.1238 (0.00)	-4.5526 (0.00)
DCPS	0.7766 (0.99)	-1.7239 (0.72)	4.2527 (1.00)	-6.2821 (0.00)	-6.3057 (0.00)	-4.2749 (0.00)
DCBS	0.4598 (0.98)	-2.0393 (0.56)	-2.5973 (0.99)	-6.5816 (0.00)	-6.4937 (0.00)	-5.4076 (0.00)

Note: MacKinnon (1996) one-sided p-values are presented in first brackets.

*Table 2: Results of ADF Unit Root Test for India*

	Levels			First Differences		
	Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
GDP	-6.7202 (0.00)	-7.8743 (0.00)	-1.0336 (0.27)	-11.5263 (0.00)	-5.1595 (0.00)	-11.6816 (0.00)
M2	-0.4671 (0.88)	-1.9221 (0.62)	2.1041 (0.99)	-4.1186 (0.00)	-4.0641 (0.01)	-3.0369 (0.00)
DCPS	-0.0632 (0.95)	-2.6659 (0.25)	1.0677 (0.92)	-2.4899 (0.12)	-2.6475 (0.26)	-2.1879 (0.02)
DCBS	-0.7621 (0.82)	-2.2798 (0.43)	1.0134 (0.91)	-2.4826 (0.13)	-4.6196 (0.00)	-2.1012 (0.03)

Note: MacKinnon (1996) one-sided p-values are presented in first brackets.

differences with trend for the DCPS and first differences with intercept for the DCBS are nonstationary in case of India, however; all the variables are stationary in their first difference form without intercept and none term.

The PP unit root results of Bangladesh and India are presented in Table 3 to 4 respectively. From Tables, it is clear that all of the variables are nonstationary in their level forms with all three terms as the calculated PP statistics are smaller than the critical values except for GDP. GDP is found to be stationary at level as we accept the null hypothesis of nonstationary. When we first differences the levels forms with all terms, then the results show that all the variables are stationary in their first difference form. The combined results from the entire test therefore suggest that all the variables are I(1) in the levels but I(0) in first differences.

Table 3: Results of PP Unit Root Test for Bangladesh

	Levels			First Differences		
	Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
GDP	-8.2436 (0.00)	-12.7544 (0.00)	-2.2371 (0.03)	-25.7730 (0.00)	-22.9279 (0.00)	-23.0284 (0.00)
M2	1.1852 (0.99)	-2.1265 (0.52)	3.7904 (0.99)	-6.1552 (0.00)	-6.1487 (0.00)	-4.6814 (0.00)
DCPS	1.4978 (0.99)	-1.6877 (0.74)	4.5851 (1.00)	-6.3393 (0.00)	-6.8085 (0.00)	-4.2161 (0.00)
DCBS	0.6420 (0.98)	-2.0298 (0.57)	2.9846 (0.99)	-6.6365 (0.00)	-6.5816 (0.00)	-5.4343 (0.00)

Note: MacKinnon (1996) one-sided p-values are presented in first brackets.

Table 4: Results of PP Unit Root Test for India

	Levels			First Differences		
	Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
GDP	-6.7001 (0.00)	-9.3585 (0.00)	-1.4344 (0.14)	-29.9742 (0.00)	-30.0325 (0.00)	-28.3544 (0.00)
M2	-0.3954 (0.90)	-1.6229 (0.76)	3.3815 (0.99)	-4.1077 (0.00)	-4.0527 (0.01)	-3.0369 (0.00)
DCPS	-0.0095 (0.95)	-1.0026 (0.93)	2.5688 (0.99)	-5.4887 (0.00)	-5.5019 (0.00)	-4.3903 (0.00)
DCBS	-0.6827 (0.84)	-1.6842 (0.74)	2.5732 (0.99)	-4.8261 (0.00)	-4.7678 (0.00)	-3.7388 (0.00)

Note: MacKinnon (1996) one-sided p-values are presented in first brackets.

## 4.2 Results of Cointegration

Having established that all variables are integrated of the same order, we proceed with the Johansen multivariate cointegration tests which allow us to test for long-run relationship between financial development and economic growth. The initial step for establishing the presence of a long-run relationship among the variables is to determine the optimal lag length for the VAR system. Lag-length misspecification for the VAR model often generates autocorrelated errors (Lütkepohl, 2005). To perform this step, five different criteria including the sequential modified likelihood ratio (LR) test statistic, final prediction error criteria (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HQ) are used to determine the lag lengths used in the VAR. These criteria are widely used in the literature

(Lütkepohl, 2005; Enders, 2007). We proceed for each criterion with a maximum of 4 lags. Residual Serial Correlation Lagrange multiplier (LM) Test is also performed to find out if there is mutual statistical independence for the different error terms. If the residuals do not fulfill the condition, then linear dependencies exist among the residuals and hence, they are said to be autocorrelated. The presence of residual serial correlation makes the result less efficient. Thus, we proceed to conduct LM tests for each suggested lags up to maximum 4 lags. Using 1 lag produces no autocorrelation in the VAR model for up to 4 lags. So, we accept VAR (1) model for cointegrating analysis. Tables 5 to 6 present the Johansen cointegration test results.

Table 5: Cointegration Results of Bangladesh

Variables	H <sub>0</sub>	H <sub>A</sub>	Trace statistics	5% critical value	Maximum eigenvalue statistics	5% critical value
No deterministic trend						
GDPM2 DCPS DCBS	r = 0	r=1	42.0932 *	40.1749	25.2951 *	24.1592
	r=1	r=2	16.7981	24.2760	11.7010	17.7973
No deterministic trend (restricted constant)						
GDP M2 DCPS DCBS	r = 0	r=1	65.2283 *	54.0790	33.0968 *	28.5881
	r=1	r=2	32.1315	35.1928	22.7231	22.2996

Note: Both trace and Maximum-eigenvalue test indicate 1 cointegrating equation at the 5 percent level.

Table 6: Cointegration Results of India

Variables	H <sub>0</sub>	H <sub>A</sub>	Trace statistics	5% critical value	critical Maximum eigenvalue statistics	5% critical value
No deterministic trend						
GDP M2 DCPS DCBS	r = 0	r=1	46.89187*	40.17493	29.11982*	24.15921
	r=1	r=2	17.77205	24.27596	11.86805	17.79730
No deterministic trend (restricted constant)						
GDP M2 DCPS DCBS	r = 0	r=1	57.85348*	54.07904	30.05043*	28.58808
	r=1	r=2	27.80306	35.19275	17.72633	22.29962

Note: Both trace and Maximum-eigenvalue test indicate 1 cointegrating equation at the 5 percent level.

Tables 5 and 6 show the cointegration results among the variables for Bangladesh and India respectively. According to Tables, both trace and maximum eigenvalue test indicates the rejection of null hypothesis of no cointegrating relationship at 5 percent level of significance as the calculated statistics are greater than the critical values and hence accept the alternative hypothesis that there is cointegrating relationship among the variables. This indicates the existence of one cointegrating

relationship among the variables in Bangladesh and India. It suggests the presence of a long term relationship among the variables – GDP, DCBS, DCPS and M2 in Bangladesh and India.

The long run impact of financial development on economic growth in Bangladesh can be explained with the equation 13 which is derived from Table 7. Equation 13 indicates that GDP is positively related to M2 and DCBS, while negatively related to DCPS in Bangladesh.

$$\text{GDP} = 3.33 + 0.01 \text{ M2} - 0.10 \text{ DCPS} + 0.12 \text{ DCBS} \quad (13)$$

*Table 7: Long Run Relation between Financial Development and Economic Growth in Bangladesh*

Cointegrating Equation	Coint. Eq1
GDP(-1)	1.000000
M2(-1)	-0.013696 (0.10676) [-0.12829]
DCPS(-1)	0.096128 (0.08287) [ 1.16003]
DCBS(-1)	-0.121212 (0.08191) [-1.47978]
C	-3.326912 (0.41583) [-8.00071]

GDP is positively related to M2 and DCBS, while negatively related to DCPS in long run.

$$\text{GDP} = 2.14 + 0.09 \text{ M2} - 0.09 \text{ DCPS} + 0.04 \text{ DCBS}$$

*Table 8: Long Run Relation between Financial Development and Economic Growth in India*

Cointegrating Equation	Coint. Eq1
GDP(-1)	1.000000
M2(-1)	-0.085741 (0.07490) [-1.14480]
DCPS(-1)	0.089086 (0.10043) [ 0.88704]
DCBS(-1)	-0.041159 (0.09281) [-0.44345]
C	-2.143706

Note: Standard errors in ( ) & t-statistics in [ ]

The long run impact of financial development on economic growth in India can be explained with the following equation 14 which is derived from Table 8. Equation 14 for India shows that GDP is positively related to M2 and DCBS, while negatively related to DCPS in long run.

$$\text{GDP} = 2.14 + 0.09 \text{ M2} - 0.09 \text{ DCPS} + 0.04 \text{ DCBS} \quad (14)$$

### 4.3 Results of ECM

Results of Granger causality based on error correction models for Bangladesh and India are presented in Tables 9 to 10. In Table 9, results of Granger causality based on error correction models for Bangladesh are presented. Coefficient of the error correction term for the cointegrating equation  $\text{GDP} = f(\text{DCBS}, \text{DCPS}, \text{M}_2)$  is negative and significant. It indicates that the causal relationship is running from  $\text{M}_2$ , DCPS and DCBS to GDP. Moreover, error correction term of  $\text{M}_2 = f(\text{DCBS}, \text{DCPS}, \text{GDP})$  and  $\text{DCPS} = f(\text{DCBS}, \text{GDP}, \text{M}_2)$  are significant and negative. Thus, the causal relationship is running from economic growth (GDP growth) to financial development ( $\text{M}_2$  and DCPS). This result implies that bi-directional causality exists between financial development and economic growth in Bangladesh. Results imply that the finance-led growth and growth-lead finance hypothesis exists for Bangladesh.

In Table 10, results of Granger causality based on error correction models for India are presented. Coefficients of the error correction terms for the cointegrating equation are significant. It reveals that the causal relationships exist between financial development and economic growth. We also find that  $\text{M}_2$ , DCBS and DCPS stimulate economic growth, while GDP stimulates DCBS. Results imply the finance-led growth and growth-lead finance hypothesis for India.

## 5. Conclusion

In this study, the dynamics of the relationship between financial development and economic growth in Bangladesh and India is analyzed using time series econometric techniques for the period 1974 to 2015. Johansen based cointegration results reveal the presence of a long term relationship between financial development and economic growth in both countries. The long run impact of financial development on economic growth is also examined. We find that DCBS is the largest positive determinant of economic growth in case of Bangladesh. On the other hand,  $\text{M}_2$  is the most effective financial development variable to increase the economic growth for India. After that we verify the causal relationship between the variables in South Asian countries by using ECM based

Table 9: Vector Error Correction Estimates for Bangladesh

Error Correction	D(GDP)	D(M2)	D(DCPS)	D(DCBS)
Cointegrating Equation 1	-0.840770 (0.19793) [-4.24792]	-0.704534 (0.30922) [-2.27845]	-0.473048 (0.19376) [-2.44143]	-0.499146 (0.36700) [-1.36006]
D(GDP(-1))	-0.182209 (0.11889) [-1.53259]	0.229388 (0.18574) [ 1.23499]	0.186682 (0.11639) [ 1.60398]	0.147113 (0.22045) [ 0.66733]
D(M2(-1))	-0.146111 (0.15598) [-0.93672]	0.600152 (0.24369) [ 2.46279]	0.509898 (0.15270) [ 3.33926]	0.622243 (0.28923) [ 2.15139]
D(DCPS(-1))	-0.240663 (0.21500) [-1.11936]	-0.131934 (0.33589) [-0.39279]	0.110760 (0.21047) [ 0.52624]	0.075588 (0.39866) [ 0.18960]
D(DCBS(-1))	0.096571 (0.16183) [ 0.59675]	-0.349600 (0.25282) [-1.38278]	-0.358603 (0.15842) [-2.26359]	-0.385294 (0.30007) [-1.28401]
R-squared	0.742675	0.017778	0.167651	0.052922
Adj. R-squared	0.713267	-0.094476	0.072526	-0.055316
Sum square residuals	63.29968	154.4990	60.66291	217.6398
S.E. equation	1.344828	2.101014	1.316520	2.493648
F-statistic	25.25372	0.158369	1.762420	0.488943
Log likelihood	-65.93756	-83.78371	-65.08660	-90.63678
Akaike AIC	3.546878	4.439185	3.504330	4.781839
Schwarz SC	3.757988	4.650295	3.715440	4.992949
Mean dependent	0.254250	1.404000	1.045250	1.253750
S.D. dependent	2.511468	2.008286	1.367026	2.427415

Note: Standard errors are in ( ) & t-statistics in [ ]

causality analysis. The ECM results show that there is bidirectional causal relationship running between financial development and economic growth in Bangladesh and India.

The study suggests that financial development has a significant effect on economic growth and vice versa in Bangladesh and India. Hence, the contribution of financial development to economic growth is considerable. It may therefore be recommended that policies ought to be directed to accelerate improvements in the financial sector. Future researches can be focused on the impact of financial liberalization on financial development and thereby economic growth.



Table 6.10: Vector Error Correction Estimates for India

Error Correction	D(GDP)	D(M2)	D(DCPS)	D(DCBS)
Cointegrating Equation 1	-1.561185 (0.26106) [-5.98017]	0.301748 (0.15850) [ 1.90375]	0.171390 (0.14849) [ 1.15426]	0.376419 (0.18233) [ 2.06448]
D(GDP(-1))	0.234051 (0.16461) [ 1.42181]	-0.021589 (0.09994) [-0.21601]	0.093799 (0.09363) [ 1.00181]	-0.020139 (0.11497) [-0.17517]
D(M2(-1))	-0.354413 (0.30943) [-1.14538]	0.513031 (0.18787) [ 2.73081]	0.308792 (0.17600) [ 1.75454]	0.318752 (0.21611) [ 1.47494]
D(DCPS(-1))	0.677052 (0.39315) [ 1.72213]	0.248868 (0.23870) [ 1.04260]	0.232965 (0.22361) [ 1.04182]	-0.154963 (0.27458) [-0.56435]
D(DCBS(-1))	-0.271664 (0.32494) [-0.83605]	-0.188078 (0.19728) [-0.95334]	-0.222925 (0.18482) [-1.20620]	0.297482 (0.22694) [ 1.31082]
C	0.095129 (0.52940) [ 0.17969]	0.669575 (0.32142) [ 2.08315]	0.560057 (0.30111) [ 1.85996]	0.566617 (0.36975) [ 1.53244]
R-squared	0.661422	0.386112	0.319861	0.289309
Adj. R-squared	0.611632	0.295835	0.219841	0.184796
Sum square residuals	207.1121	76.34723	67.00274	101.0292
S.E. equation	2.468103	1.498501	1.403805	1.723788
F-statistic	13.28402	4.276943	3.197957	2.768159
Log likelihood	-89.64515	-69.68579	-67.07462	-75.28814
Akaike AIC	4.782258	3.784289	3.653731	4.064407
Schwarz SC	5.035590	4.037621	3.907063	4.317739
Mean dependent	-0.039750	1.382500	0.948500	1.227500
S.D. dependent	3.960421	1.785747	1.589334	1.909197

Note: Standard errors in ( ) &amp; t-statistics in [ ]

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## Economic Viability of Crop Diversification in Northern Bangladesh

MOHAMMAD MONIRUL ISLAM\*  
MD. ELIAS HOSSAIN\*\*

**Abstract:** *The present study is an attempt to analyze whether practicing crop diversification is economically viable or not. Using farm level survey data, this study considers number of crops produced by a farm and proportion of rice crop area to gross crop area to observe whether the farm practices crop diversification or rice monoculture. Similarly, this study employed net return analysis and benefit cost ratio (BCR) analysis to investigate economic viability of crop diversification. The study is based on primary data collected from a total of 343 farmers taken from eight villages from four districts of northern Bangladesh randomly by using multi-stage random sampling procedure. It is found from the study that three fourths of the total farmers grow both rice and non-rice crops and only one fourth of the total farmers practice rice monoculture. It is also found that 63 percent of gross crop area under the study villages has been used to produce rice which is less than the national figure of 78.52 percent. A farm grows 4.46 crops, on the average, in a cropping year. It is found from the study that northern Bangladesh is a mediocre crop diversified area in Bangladesh and Rajshahi is the most crop diversified area among the sample districts. It is also found that vegetables, spices base cropping pattern offer more returns than that of rice based cropping pattern and non-rice crops especially vegetable, spices and jute create more employment generation than that of cereal, especially rice. Therefore, considering different aspects of crop production this study concludes that vegetables, spices, potato based cropping patterns are*

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\* Assistant Professor, Department of Economics, Nagarpur government college, Tangail  
E-mail: rawnak\_mahmud@yahoo.com

\*\* Professor, Department of Economics, Rajshahi University, Rajshahi-6205  
E-mail: eliaseco@ru.ac.bd

*economically more viable than others. In conclusion, the study offers some suggestions to enhance practice of crop diversification. Firstly, Rabi season should be used to produce different types of non-rice crops, as higher numbers of crops grow in Rabi season than that of other seasons. In this season, various non-rice crops like vegetables, spices and other shorter duration crops should be grown in accordance with land quality. Secondly, farms should include at least one non-rice crop in their cropping pattern, as rice monoculture has many adverse effects on the environment. Similarly, some portion of cultivable land should be allocated for producing spices. Likewise, a shorter duration leguminous crop should be grown between early aman and late boro. Thirdly, proper facilities to non-rice crops production like supplying of quality seeds, supplying of fertilizer and insecticides, and also the irrigation equipments should be provided with reasonable subsidy by the relevant organizations of the government.*

**Keywords:** *Crop diversification, Economic viability, Net Return, Benefit Cost Ratio (BCR).*

## 1. Introduction

Agriculture is the lifeblood of Bangladesh economy. It is also one of the major sources of livelihood of the people in Bangladesh. It employs almost 50 percent of labor force and contributes 19.41 percent to the Gross Domestic Product (GDP) of which 10.86 percent comes from crops and horticulture in the FY 2011-12 (GOB, 2013). Rice production dominates the farming activities of Bangladesh and it accounts for 75 percent of gross crop area (BBS, 2011). Apparently, there are basically two reasons for which farmers of Bangladesh concentrate on rice production. Firstly, rice provides the main source of food for the family throughout the year. To ensure food security for the family members, the farmers have a little option to grow crops other than rice. Secondly, *Green Revolution* technology such as HYV seeds, irrigation facility and fertilizer induced farmers to grow rice. As a result, production of major cereals especially rice has been increased enormously at the cost of minor crops. *Green Revolution* provides the country so called self-sufficiency in food crop production to some extent but creates many adverse effects, viz., it decline water table, reduces soil fertility, erodes biodiversity, creates nutritional imbalance in human food and snatches way diversity in crop production. Husain, Hossain and Janaiah (2001) and Rahman (2010) observed that intensive rice monoculture led to displacement of land under low productive non-rice crops such as pulses, oilseeds, spices and vegetables, erosion of crop diversity, thereby, endangering sustainability of crop-based agricultural production system.

In order to minimize the adverse effects of rice monoculture the government has launched crop diversification program (CDP) in 1990s and has been continuing the program in different regions of the country till today. It is said that crop diversification (CD) is an effective strategy to address the adverse effect of rice monoculture and make agriculture sustainable. It enhances food and nutrition security for the people and promotes agricultural and rural development (Acharya *et al*, 2011; Malik & Singh, 2002; Pattanayak & Nayak, 2003). Crop diversification also helps to utilize scarce land and valuable water resources effectively and make agriculture environment friendly (De & Chattopadhyay, 2010; Joshi *et al*, 2007; Kumari *et al*, 2010; Singh, 2001). In addition, by minimizing price and yield risk created by climatic variability and price volatility of agricultural production, it offers comparatively high return. Again, it offers higher labor productivity, maximizes use of resources and utilizes the land efficiently (Ashfaq *et al*, 2008; Mehta, 2009; Mukherjee, 2012). It also creates opportunities for more employment and higher income through efficient use of resources (World Bank, 1990). It is clear from the discussion that practice of crop diversification helps the farmers in different ways but yet we do not know what the level of crop diversification in Bangladesh is and how to measure the level of crop diversification. Thus, in spite of having such advantages of crop diversification, it is not clear yet about the actual situation of crop diversification in Bangladesh.

Similarly, there is a worldwide effort in favor of diversification in agriculture towards reducing various risks, as is evident in Bangladesh. Besides, practice of crop diversification reduces environmental risk; price and yield risk generated from rice monoculture are evident from different studies. Nonetheless, researcher's knowledge goes so far, there have been found no studies on profitability of crop diversification.

It is apparent that some farmers are commercializing agriculture to get more profit from their farm whereas some other produce different types of non-rice crops to make higher profit. In addition, it is found in many instances that farmers cannot off-set production cost of rice because of higher input cost and lower market price of rice. Siddique (2013) found farmers are losing interest in cultivating *boro* due to high production cost and low market price. Farmers are being forced to grow crops like maize. However, statistics show the different picture that is yet more than 70 percent of gross crop area is devoted to rice production in Bangladesh. Again, adding non-rice crops or multiple crops in the existing cropping pattern is comparatively profitable or not is unknown to all. Thus, it claims to explore

whether crop diversification is economically viable alternative to rice monoculture or not. In this backdrop, this study focuses on economic viability of crop diversification taking the special case study of northern Bangladesh.

## 2. Literature Review

There have been several studies found on different aspect of crop diversification home and abroad. Most of the studies found on the concepts of crop diversification (Acharya *et al*, 2011; Akanda, 2010; Bhattacharyya, 2008; Joshi, 2011; Mukherjee, 2012), measurement index of crop diversification (Aneani *et al*, 2011; Ashfaq *et al*, 2008; Ghosh, 2010; Jha *et al*, 2009; Kumari *et al*, 2010; Mukherjee, 2012) and factors influencing crop diversification (Acharya *et al*, 2011; Bhattacharyya, 2008; Malik & Singh, 2002; Mesfin *et al*, 2011; Pingali *et al*, 1997; Rahman, 2009). So far, researcher knowledge goes, none of the studies found on the profitability of crop diversification. However, several recent studies have attempted to estimate profitability of crop production. They used various methods to analyze profitability. Mostly used methods are total cost and gross return ( $\Pi = TR - TC$ ) analysis, benefit cost ratio (BCR), Gross Margin (GM) and Net Margin (NM) etc. There are host of studies where researchers have used cost benefit analysis (CBA) to measure the profitability of the crops. For example, Ahmed *et al* (2013), Haque *et al* (2013), Haque *et al* (2012), Hoq *et al* (2012), Kabir and Islam (2012), Karim *et al* (2009), Moniruzzaman *et al* (2009) and Mukul and Rahman (2013) have used benefit cost ratio (BCR) over total cost and total variable cost to analyze profitability of respective crops in their study.

Kabir and Islam (2012) did a comparative study on *Rabi* crops by using farm level primary data. They did cost benefit analysis by using net margin and gross margin approaches. They found that wheat is a more profitable *Rabi* crop than other crops like grass pea, mustard, lentil. Farmers earned the highest per hectare gross return (Tk.98,646) and gross margin (Tk.22,870) from the Wheat - *Aus* rice - T. *Aman* rice pattern whereas *Boro* rice - Fallow - T. *Aman* pattern produced the lowest gross return (Tk.65,918) and gross margin (Tk.10,134). Higher benefit was achieved from the pattern Wheat - *Aus* rice - T. *Aman* rice because of less production cost and high price of wheat grain, though three cereals crops could exhaust soil nutrient so that Mung-bean - *Aus* rice - T. *Aman* pattern may be alternate option to sustain soil health as well as productivity of the selected area.

Afroz and Islam (2012) estimated the relative profitability of growing *aus* rice and jute and to determine the resource use efficiency in the production of these crops by using primary data. They used benefit cost ratio and found that total costs for



producing jute and *aus* rice were Tk.50,254 and Tk.44,970 per hectare, respectively. The equivalent gross returns were Tk.83,717 and Tk.55,762, respectively. Accordingly, net return for jute was Tk.33,463, which was about three times higher than that for *aus* rice (Tk.10,792/hectare). Moreover, BCR of producing jute was about 30 percent higher (1.7) than that of *aus* rice (1.3). Cobb-Douglas production function was used to estimate specific effects of individual inputs on production of jute and *aus* rice. Resource use efficiency analysis showed that neither in jute nor in *aus* rice production farmers was found efficient enough to use various inputs. Therefore, it seems that efficient and judicious use of various resources would enable both jute and *aus* rice farmers to earn more profit.

Haque *et al* (2012) analyzed profitability of hybrid maize seed by using primary data collected from hybrid maize seed contract growers and 120 maize (non-seed) growers were selected randomly for the study. In this case, they used cost benefit ratio and found that the cost of production was higher for NGO (Tk.66,472/ha) than the public agency (Tk.64,836/ha) and private company (Tk.59,352/ha). The yield of hybrid seed was higher under NGO (3,780 kg/ha) than that of public agency and private company. Net return of hybrid seed production for contract growers was higher under public agency (Tk.78,204/ha) compared to private company (Tk.39,088/ha) and NGO (Tk.33,246/ha). Benefit cost ratio (BCR) was higher for the contract growers of public agency (2.21). Net return of hybrid maize seed production was 50 percent higher than that of non-seed production.

Mukul and Rahman (2013) estimated profitability of banana production by using primary data. In the study, they investigated total cost, profit and benefit cost ratio for different marketing channel like banana producers, wholesalers and retailers. They found that profit for producer was Tk.55,002.8 per hectare. Similarly, benefit cost ratio for producers was 1.40.

Haque *et al* (2013) studied the profitability of crop diversification by using data collected from randomly selected farmers. They used benefit cost ratio over variable cost as well as total cost. They found that the costs of rose cultivation were Tk.3,87,569 and Tk.2,75,214 per hectare on full cost and variable cost basis, respectively. The major share of full cost was incurred for human labor (30 percent), followed by land use (23 percent), fertilizer (17 percent), and irrigation (12 percent). The net return from rose cultivation was Tk.23,31,196 per hectare. The benefit cost ratios were 2.29 and 1.63 on variable cost and full cost basis, respectively. The highest profit was obtained from rose cultivation compared to its competitive crops like potato - jute, lentil - *teel* and mustard - *mung* - bean for Rose.

Moniruzzaman *et al* (2009) analyzed profitability level of maize production in Bangladesh. They collected data from 200 randomly selected maize growers using pre-designed interview schedule. To analyze profitability, they used net margin, gross margin and benefit cost ratio and found that the average cost of maize production were Tk.44,197, Tk.33,195 and Tk.24,441 per hectare on total cost, variable cost and cash cost basis, respectively and gross return was Tk.69,773 per hectare. The gross margin was Tk.36,578/ha on total variable cost (TVC) and Tk.45,332/ha on cash cost basis. The net return was observed to be Tk.25,575 per hectare. Benefit cost ratios were calculated as 1.58, 2.10 and 2.85 on total cost, variable cost and cash cost basis, respectively.

Although there are several research works on profitability of various issues, very few of them were focused on crop diversification. To analyze the profitability most of them use conventional profit determining model, i.e. total costs and total returns analysis. To find out profit, total costs are deducted from total returns. Zahir (1993) observed that vegetables, spices and modern variety of potatoes are much more profitable than modern variety of *boro* rice. He also found that vegetables-based cropping pattern on irrigated high land was much more remunerative than *boro*-based cropping pattern. The results of financial and economic analyses had shown that a number of crops such as potato, vegetables, onion and cotton have high financial and economic return which were significantly higher than those of rice. On the other hand, wheat, sugarcane and oilseeds had a very low economic return although private return from sugarcane was quite high (Mahamud *et al*, 1994). Alam (2009) studied on the comparative cost and return of the various crops and found diversified crops were more profitable than rice and it had a positive impact on reducing poverty through consuming nutritional food. Alam also concluded diversified agriculture might be a leader of uplifting socio economic condition through effective and pragmatic planning on income and nutrition.

### **3. Methodology**

The objective of this study is to investigate whether diversified cropping practice is economically viable to the farmers. Thus, this study used primary data from farm households to observe whether the farm practices crop diversification or rice monoculture and to analyze economic viability of crop diversification in the study area. To observe whether the farm practices crop diversification or rice monoculture, this study considers number of crops produced by a farm and proportion of rice crop area to gross crop area. Economic viability basically refers to profitability and this study employed net return analysis and benefit cost ratio

(BCR) analysis to investigate the economic viability of crop diversification. Computation procedures under these techniques are provided below:

### 3.1 Net Return Analysis

Net return analysis is the most common approach for determining and comparing profitability of different crops. Profit is defined as the difference between the gross return and total cost. Thus, to analyze profitability, gross return and total cost of the crops were considered. Total cost includes all types of costs which are paid from farmers’ pocket and imputed cost of family labor and other factors of production. All types of imputed costs were converted according to the market price. Even land and other agricultural implements of the owner farmers were treated as rented one. Total return includes return from main product and by-products. Farmers’ actual cost and returns of production have been calculated in this research. Where farmers buy inputs of production at retail price and sell their product at wholesale price. The following conventional profit determining model, which is the simplest procedure to determine profitability and commonly used, were employed to analyze farmers’ profitability in producing crops.

$$GM = (GR - TVC) \dots\dots\dots (1)$$

$$NR = (GR - TC) \dots\dots\dots (2)$$

Where,

$$GR = \sum_{i=1}^n P_{qi} Q_i \dots\dots\dots (3)$$

$$TC = TFC + TVC \dots\dots\dots (4)$$

GM = Gross Margin (profit) from i<sup>th</sup> crop per *bigha* (33 decimal) of land

NR = Net Return (profit) from i<sup>th</sup> crop

GR = Gross return from i<sup>th</sup> crop

TC = Total cost of i<sup>th</sup> crop

TVC = Total cost except land cost (summation of labor cost, tillage cost, seed cost, fertilizer cost, pesticide cost and irrigation cost)

TFC = Total fixed cost (land rent)

P<sub>qi</sub> = Unit price of i<sup>th</sup> main crop and related by-products (if any)

Q<sub>i</sub> = Quantity of i<sup>th</sup> main crop and related by-products (if any)

### 3.2 Benefit Cost Ratio (BCR) Analysis

Undiscounted BCR is another technique of profitability analysis. BCR analysis is an important tool to assess economic viability of farming. It is the ratio of total cost to total return (gross return). If BCR is greater than one, the farm is considered as profitable. This study has used undiscounted BCR to compare profitability of monoculture and diversification. The formula is stated as:

$$BCR = \frac{TR}{TC} \dots\dots\dots (5)$$

The farm is treated as a profitable farm if the value of BCR is greater than one (BCR>1).

### 3.3 Sample Selection and Data Collection

The present study is mainly based on primary data collected from sample households. In this purpose, eight villages from four districts under northern Bangladesh, which is comprised of Rajshahi and Rangpur divisions, have been selected. The sample farmers are chosen randomly using multi-stage random sampling method. For conducting the present study, the researcher selected the study area with great care so that the estimated results become representative. The rationale behind selecting northern Bangladesh for the present study is that this area is an agriculture-based area. Although rice is the dominant crop in northern Bangladesh, it also produces several other minor crops such as wheat, potato, vegetables, jute, maize, oilseeds, pulse, onion, garlic etc. In northern Bangladesh, farming is the principal occupation of most of the population and their livelihood mostly depend on agricultural activities. The selection of sample for this study involves the selection of districts, upazila and villages. The first step was to select four districts out of sixteen districts from northern Bangladesh. Four districts that are chosen purposively are Thakurgaon and Kurigram from Rangpur division and Rajshahi and Naogaon from Rajshahi division. The districts have been selected purposively on the basis of consultation with regional office of DAE. In the next step, one upazila from each district has been selected randomly. Thus, Pirgonj upazila of Thakurgaon district, Rajarhat upazila of Kurigram district, Paba upazila of Rajshahi district and Mohadebpur upazila of Naogaon district have been selected for the survey. From each of the selected upazila, two villages have been selected randomly. After that farm households have been listed from the records available to the Sub Assistant Agriculture Officer (SAAO) of the respective villages and then sample households are chosen by using random sampling

method. A total number of 343 farm households, using statistical formula proposed by Arkin and Colton (1963), are selected for this study. Finally, these data have been collected from head of the each sample household.

#### 4. Result and Discussion

##### 4.1 Level of Crop Diversification

Table 4.1 presents existing cropping practice and level of crop diversification amongst the sample households in each district. It is clear from Table 4.1 that there are distinct variations among the regions with respect to each of the aspects considered.

Table 4.1: Extent of Crop Diversity among Sample Farmers

Variables	Rajshahi	Naogaon	Kurigram	Thakurgaon	All
Only rice growers	2%	34.34%	42.85%	18.07%	24%
Only non-rice growers	3%	0%	0%	1%	1%
Both rice and non-rice crops	95%	65.66%	57.15%	80.93%	75%
Average number of crops grown	6.26	3.56	2.58	4.46	4.46
Maximum number of crops grown	17	10	7	14	17
Proportion of rice crops area	31%	68%	70%	66%	63%
Number of observations	91	99	70	83	343

Source: Field Survey, 2013.

Source: Field Survey, 2013. Twenty four percent of the total farmers adopted rice monoculture and 75 percent of the total farmers adopted both rice and non rice crops in the sample districts. In terms of area allocated to crops, the rice cover 63 percent of gross crop area which is less than the national level of 78.52 percent (BBS, 2011). It is found from the study that 31 percent of gross crop area in Rajshahi has been used to produce rice during the survey year, 68 percent in Naogaon, 70 percent in Kurigram and 66 percent in Thakurgaon. It is also found that a farm grows 4.46 crops in a year. Thus, the study indicates that cropping system in the study area is relatively diverse.

##### 4.2 Average Yield of Different Crops in the Study Area

Yield, output price and production cost of different crops are important indicators in economic return analysis of the crops. It is observed that in Bangladesh, there is higher yield gap between expected yield and actual yield of the crops which is attributable to climatic variations, soil structure, and some socio-economic and demographic characteristics of the farms and farmers.

Similarly, same crops do not grow across all the regions in the country. Agro-climatic conditions influence crop choice by the farms in different areas. Moreover, yield of different crops is also not same in all the areas. Putting it differently, some areas are specialized for production of some crops rendering higher yield rate of those crops while the other areas good for other crops. Table 4.2 shows average yields of different crops in the sample districts in northern Bangladesh. It is clear from the table that there are clear variations in crops under choice and yields across the sample districts. As is found from the table, average yield per *bigha aus* rice is 570 kg, *aman* 640 kg, *boro* 962 kg, wheat 573 kg, maize 1,067 kg, *musur* 195 kg, mustard 192 kg, jute 327 kg, chili 1,738 kg, potato 3,292 kg and yield of different vegetables per bigha ranges between 2,500 kg to 4,000 kg. Yield of different crops per bigha in Bangladesh is still considered very low in comparison to that in many other countries of the world.

Table 4.2: Average Yield of Different Crops by Districts (Kg/ bigha)

Crops	Rajshahi	Naogaon	Kurigram	Thakurgaon	All
<i>Aus</i>	540	536	--	619	570
<i>Aman</i>	673	655	594	640	640
<i>Boro</i>	943	954	942	1,003	962
Wheat	579	550	525	582	573
Maize	1,044	1,130	993	1,104	1,067
<i>Musur</i>	220	-	-	180	195
Mustard	193	191	191	190	192
Jute	346	314	353	271	327
Chili	1,797	1,638	1,665	1,697	1,738
Onion	1,603	1,388	-	1,457	1,520
Garlic	1,024	1,004	-	830	983
Potato	3,672	3,266	3,163	3,081	3,292
Brinjal	4,527	3,311	3,172	3,109	3,482
Bot. gourd	2,786	3,400	2,820	-	2,868
Ash gourd	3,400	3,284	3,040	-	3,274
Point gourd	2,377	2,314	1,860	2,300	2,272
Yard long been	2,749	2,114	2,100	-	2,429
Cucumber	2,498	2,442	2,100	-	2,376
Bitter gourd	2,461	2,145	1,600	2,240	2,309
Tomato	4,695	3,275	-	3,343	4,023
Cauliflower	-	2,500	3,111	2,767	2,838
Cabbage	3,200	3,233	3,400	4,260	3,734

Sources: Author' calculation

In disaggregated analysis, average yield of *aus*, *boro* and wheat grown in Thakurgaon is the highest among the sample districts. Similarly, average yield of *boro* rice in Thakurgaon is 1,003 kg per *bigha* followed by Naogaon 954 kg, Rajshahi 943 kg and Kurigram 942 kg. Average yield of T. *aman* in Rajshahi is

higher than that of other districts in the study area. It is 673 kg in Rajshahi, 655 kg in Naogaon, 640 kg in Thakurgaon and 594 kg in Kurigram. In Naogaon district, the average yield of maize is 1,130 kg per *bigha* followed by Thakurgaon 1,104 kg, Rajshahi 1,044 kg and Kurigram 993 kg per *bigha*. It is clear from the table that only the sample farms of Rajshahi and Thakurgaon districts were found to grow pulses and yield of pulses is higher in Rajshahi than that in Thakurgaon. Average yield of mustard is almost the same across the sample districts. The highest yield of jute is found in Kurigram. The table also shows that yield of spices in Rajshahi districts is the highest. In Rajshahi, average yield of chili, onion and garlic is 1,797 kg, 1,606 kg and 1,024 kg per *bigha*, respectively. It is 1,638 kg, 1,388 kg and 1,004 kg respectively, in Naogaon and 1,697 kg, 1,457 kg and 830 kg, respectively in Thakurgaon district. Sample farms Kurigram district were not found to cultivate onion and garlic. In case of potato, the highest yield is 3,672 kg per *bigha* found in Rajshahi followed by 3,266 kg in Naogaon, 3,163 kg in Kurigram and 3,081 kg in Thakurgaon districts. It is apparent from the table that yield rate of major vegetables grown in Rajshahi district is higher than those of others.

The table clearly presents that Rajshahi district grows the highest number of crops amongst the sample districts. Besides, most of the non-cereal crops' yield is also higher in Rajshahi than that of other districts. The reasons behind growing the highest number of crops and obtaining higher yield in Rajshahi district is the farmers' motivation for profit, fertile soil, infrastructural facilities, available irrigation facilities, vicinity to urban centre etc. It is opined by many people that huge demand for different crop by the people of the metropolis, marketing facility in and from the city and irrigation facility provided by the BMDA are some of the reasons behind growing different crops and the comparatively high yield in Rajshahi district. One thing is also clear from the above discussion suitability of soil also influence the choice of crops by the farms. It is found during the data collection that soil of Rajshahi district is fertile and conducive for various crops to grow while the soil of Naogaon district although fertile is mostly conducive to grow rice only.

Because of the variation in yields and condition of soil fertility along with climate variability, farms of different sizes and different districts obtained different level of returns for different crops. Table 4.3 presents gross returns of different crops. It is found from the table that price of per 40 kg *aus* paddy is Tk.562, *aman* paddy is Tk.656 and *boro* paddy is Tk.558. Similarly, per 40 kg *musur* at prices Tk.2,138. Again, price of per 40 kg jute is Tk.1,306, chili Tk.711, onion Tk.694 and garlic Tk.1,433. Likewise, per 40 kg potato, cucumber, tomato, cabbage

prices are Tk.369, Tk.529, Tk.464 and Tk.445, respectively. Thus, a farm obtained a gross return (value of total product) is Tk.8,702 from cultivation of *aus* paddy per *bigha* land. *Aman* Tk.11,510 *boro* Tk.14,410, wheat, Tk.13,100 and maize Tk.12,888. Similarly, gross return is Tk.46, 673 from per *bigha* tomato cultivation. Cabbage Tk.41,562, cauliflower Tk.33,174, brinjal Tk.38,685, yard long bean Tk.35,037, potato Tk. 30,351, chili Tk.30,893, onion Tk.26,354, garlic Tk. 35,202, jute Tk.12,187, etc.

Thus, it is found that gross returns from vegetables, spices, jute and oilseed etc. are higher than rice, wheat, maize etc. In short, gross returns from non-rice crops are comparatively high. This is because of the higher yields and prices of different vegetables than that of rice.

Table 4.3: Gross Returns from Different Crops (per *bigha*)

Crops	Yield (Kg)	Unit Price (Tk./40kg)	Main crop (Tk.)	By product	GR (Tk.)
<i>Aus</i>	570	562	8,002	700	8,702
<i>Aman</i>	640	656	10,510	1,000	11,510
<i>Boro</i>	962	558	13,410	1,000	14,410
Wheat	573	901	12,900	200	13,100
Maize	1,067	543	14,488	400	14,888
<i>Musur</i>	195	2,138	10,431	-	10,431
Mustard	192	1,792	9,604	-	9,604
Jute	327	1,306	10,687	1,500	12,187
Chili	1,738	711	30,893	-	30,893
Onion	1,520	694	26,354	-	26,354
Garlic	983	1,433	35,202	-	35,202
Potato	3,292	369	30,351	-	30,351
Brinjal	3,482	444	38,685	-	38,685
Bot. gourd	2,868	398	28,544	-	28,544
Ash gourd	3,274	368	30,121	-	30,121
point gourd	2,272	533	30,276	-	30,276
Yard long been	2,376	577	35,037	-	35,037
Cucumber	2,309	529	31,420	-	31,420
Tomato	4,023	464	46,673	-	46,673
Cauliflower	2,838	468	33,174	-	33,174
Cabbage	3,734	445	41,562	-	41,562

Sources: Author's calculation.

### 4.3 Production Cost of Growing Different Crops

Not only gross returns but also input cost is also important for analyzing economic viability of any crop. Higher production cost reduces profit margin of the farms. Input cost, particularly, is a significant determinant of choice of crops. Generally, farmers are reluctant to grow those crops that incurs higher input cost and comparatively low output price. Inputs are not used equally in growing different



crops. Some crops need higher amount of some inputs and some crops need lower amount. For example, *boro* needs higher degree of irrigation whereas wheat and maize need less irrigation and pulses necessitate no irrigation. Similarly, some crops require more fertilizer and pesticides compared to others.

Production cost of a farm for different crops constitute the total cost of producing those crops which include fixed cost (land rent), labor cost, tilling cost, seed cost, fertilizer cost, pesticide cost and irrigation cost. Table 4.4 presents production cost of different crops in the study area. In aggregated analysis, it is evident from the table that production costs of potato, vegetables, spice are higher than those of other crops and production cost of other crops. It is found that total cost of potato cultivation per *bigha* is Tk.20,305. It is Tk.10,266 for jute, Tk.16,876 for spices, Tk.18,082 for vegetables, Tk.10,843 for maize and Tk.11,763 for *boro* paddy production. In disaggregated analysis, it is found from the table that in spices production the major share of total cost is labor cost. Labor cost of spices

Table 4.4: Production Cost of Different Crops in the Study Area (Tk./bigha)  
TVC and % of Total cost

Crops	TC	TFC	Labor	Tilling	Seed	Fertilizer	Pesticide	Irrigation
<i>Aus</i>	7,939	1,819	2,758 (35)	847 (11)	456 (6)	1,092 (14)	492 (6)	475 (6)
<i>Aman</i>	8,967	2,205	3,153 (35)	930 (10)	502 (6)	1,268 (14)	476 (5)	433 (5)
<i>Boro</i>	11,763	2,390	3,655 (31)	1,007 (9)	736 (6)	1,865 (16)	615 (5)	1,495 (13)
Wheat	9,991	2,615	2,841 (28)	1,020 (10)	767 (8)	2,058 (21)	--	690 (7)
Maize	10,843	1,994	3,724 (34)	968 (9)	572 (5)	2,369 (22)	548 (5)	668 (6)
Pulse	5,700	1,422	1,798 (32)	638 (11)	355 (6)	1,251 (22)	236 (4)	--
Mustard	5,966	1,335	1,679 (28)	837 (14)	345 (6)	1,285 (22)	265 (4)	220 (4)
Vegetables	18,082	2,830	5,922 (33)	1,030 (6)	2,499 (14)	3,142 (17)	1,568 (9)	1,091 (6)
Spices	16,876	2,707	6,519 (39)	1,059 (6)	1,392 (8)	3,178 (19)	1,216 (7)	805 (5)
Jute	10,266	2,477	4,098 (40)	982 (10)	383 (4)	1,470 (14)	428 (4)	428 (4)
Potato	20,305	2,435	5,219 (26)	1,027 (5)	5,873 (29)	3,276 (16)	1,692 (8)	783 (4)

Source: Author's calculation (. ) indicates % of total cost

production is Tk.6,519 followed by vegetables Tk.5,922, potato Tk.5,219, jute Tk.4,098, maize Tk.3,724 and *boro* Tk.3,655. If it is analyzed in terms of percentage, it is found that share of labor cost of the total cost varies among different crops, e.g., labor cost of cereals ranges from 28 percent to 35 percent of total cost. Labor cost of wheat is 28 percent of the total cost whereas it is 35 percent for *aus* and *aman* paddy, 31 percent for *boro* and 34 percent for maize production. Share of labor cost of jute production is the highest among the crops, which is 40 percent of total cost. It is 39 percent for spices and 34 percent for vegetables.

In the study area, tillage cost of mustard is 14 percent of the total cost and it is the highest among different crops. Tillage cost of cereals, pulses and jute differ from 9 percent to 11 percent of total cost, and it is 6 percent for vegetables and 5 percent for potato. Share of seed cost to the total cost is the highest for potato production which is 29 percent of total cost. Seed cost of vegetables is also comparatively high. It is 17 percent of total cost. Seed cost of cereals, pulses, mustard and others is almost same.

Fertilizer cost of wheat, maize, pulses and mustard are 21 percent to 22 percent of total cost and it is 14 percent to 16 percent for paddy, potato and jute. Vegetables and spices need 17 percent and 19 percent of total cost respectively as fertilizer cost. Wheat does not require any pesticide cost whereas in vegetables, pesticide cost is the highest proportion to the total cost. It is 9 percent of total cost. Cereal, jute and mustard need 4 percent to 6 percent of total cost as pesticide cost. *Boro* paddy needs the highest proportion of irrigation cost to the total cost and it is 13 percent of the total cost. Pulses necessitate no irrigation cost and other crops need 4 percent to 7 percent cost of total cost as irrigation cost.

From the discussion it is found that major share of total cost is calculated for human labor to produce most of the crops. In the case of potato production major share of total cost is incurred for purchasing of seed as potato requires higher amount of seed compared to other crops. It is also found that human labor cost of major non-cereal crops is higher than that of cereal which indicates non-cereal crops generate more employment for agriculture laborer.

#### **4.4 Net Return and Benefit Cost Ratio Analysis of Different Crops in the Study Area**

Table 4.5 presents cost-benefit scenario of various crops grown in the study area. The study analyzes net returns and BCR to explore economically viable cropping patterns. It is found from the table that higher gross return is generated from

vegetables production such as gross return from tomato is Tk.46,673 per *bigha* followed by cabbage Tk.41,562, brinjal Tk.38,685 and garlic Tk.35,202. Similarly, it is Tk.30,893 for chili, Tk.30,351 for potato, Tk.14,410 for *boro*, Tk.10,431 for *masur* and Tk.9,604 for mustard. Comparatively high yields and prices inflate the gross returns of these crops. Thus, it is clear that majority of higher return offering crops are vegetables. It is also found that gross return from rice is comparatively very low. However, higher gross return does not necessarily mean higher profit. It needs to analyze net return and BCR to find out the profitable ones. Net return and BCR analysis includes Total cost incurred and gross return obtained from the crops. Higher gross return and lower total cost increases net return and BCR of the crops. From the analysis highest net return is found from cabbage and it is Tk.26,453 per *bigha* followed by tomato Tk.22,167, brinjal Tk.21,192, yard long bean Tk.19,658, cauliflower Tk.18,319 and garlic Tk.17,653. When rice is considered, it is found that net return is Tk.764 for *aus*, Tk.2,582 from *aman*, and Tk.2,646 from *boro*. The highest BCR is found from turmeric. The BCR of turmeric is 2.84 followed by cabbage (2.75), yard long bean (2.28), cauliflower (2.23), brinjal (2.21), ash gourd (2.03), garlic (2.01), tomato (1.9) and chili (1.85). Similarly, BCR of *aus* is 1.1, jute (1.18), *boro* (1.22), *aman* (1.28), wheat (1.31), maize (1.37) and potato (1.45).

Table 4.5: Net Return and BCR of Crops in the Study Area(Tk./bigha)

Crops	A	B	C	D	E	F
	GR	TVC	TC	GM (A-B)	NR (A-C)	BCR (A/C)
<i>Aus</i>	8,702	6,119	7,939	2,583	764	1.10
<i>Aman</i>	11,510	6,584	8,967	4,926	2,542	1.28
<i>Boro</i>	14,410	9,375	11,765	5,036	2,646	1.22
Wheat	13,100	7,376	9,991	5,725	3,109	1.31
Maize	14,888	8,843	10,855	6,045	4,034	1.37
<i>Musur</i>	10,431	4,825	6,138	5,606	4,294	1.70
Mustard	9,604	4,466	6,315	5,138	3,289	1.52
Jute	12,187	7,655	10,296	4,532	1,892	1.18
Chili	30,893	13,924	16,727	16,969	14,166	1.85
Onion	26,354	15,097	18,044	11,257	8,310	1.46
Garlic	35,202	14,875	17,549	20,327	17,653	2.01
Potato	30,351	17,871	20,863	12,480	9,487	1.45
Brinjal	38,685	14,897	17,493	23,788	21,192	2.21
Ash gourd	30,121	10,725	14,827	19,396	15,294	2.03
point gourd	30,276	15,355	19,632	14,920	10,644	1.54
Yard long bean	35,037	11,340	15,379	23,697	19,658	2.28
Cucumber	31,420	14,033	18,238	17,387	13,182	1.72
Tomato	46,673	20,094	24,507	26,580	22,167	1.90
Cauliflower	33,174	12,421	14,855	20,753	18,319	2.23
Cabbage	41,562	12,757	15,110	28,806	26,453	2.75

Source: Author's calculation

It is clear from the table that farmers earn higher returns from the production of vegetables and lower returns from the cereal crops. It is also apparent from the table that the lowest returns come from paddy. Mustard, pulses and spices provide comparatively high returns. Reasons behind higher returns from vegetables, spices and pulses production are higher yield, higher market price and comparative low input cost. However, causes of comparatively low returns from cereals are higher input cost and lower market price.

Rapid urbanization, change of taste, infrastructural development and economic growth change the food habit of the people and accordingly demand for vegetables, pulses and spices is also increasing gradually. Increasing demand of vegetables, pulses and spices pushes the price of these crops upward. Moreover, because of higher yield and facilities of quick transportation of vegetables to town area, farms receive higher returns. Although returns from pulse is comparatively low, its input cost is also lower but higher demand makes the price go up and ultimately farms get higher returns. Furthermore, these crops are labor intensive and in most cases, farms use their family labor to produce them. This is another advantage of these crops.

It is stated earlier that net returns from cereals are lower than those of all other crops grown in the sample area. Because yield of *aus* and *aman* paddy and wheat is comparatively low and so is the market price of output, consequently net returns are low from the crops. Yield of *boro* and maize is comparatively high and their input cost is also higher with lower market price of output, as a result, returns are lower. Distorted and defective market system deprives the farmers from getting

Table 4.6: Net Return and BCR by Group of Crops (Tk./bigha)

Crops	A	B	C	D	E	F
	GR	TVC	TC	GM (A-B)	NR (A-C)	BCR (A/C)
Paddy	12,465	7,745	10,070	2,395	2,395	1.24
Wheat	13,100	7,376	9,991	5,725	3,109	1.31
Maize	14,888	8,843	10,855	6,045	4,034	1.37
Pulses	8,748	4,466	5,553	3,195	3,195	1.58
Oilseed (Mustard)	9,604	4,466	6,315	5,138	3,289	1.52
Spices	30,045	14,282	17,090	15,763	12,955	1.76
Vegetables	32,177	14,926	17,857	17,251	14,320	1.80
Cash crop (jute)	12,187	7,655	10,296	4,532	1,892	1.18

Source: Author's calculation

fair returns from their products. Indebtedness and lack of the storage facility compel the farmers to sell their crops especially paddy during the harvesting time. Infestation of intermediaries, government's untimely procurement of rice and the farmers' urgent need for cash eat up the major portion of the returns from the crops (Bayes, 2012).

Table 4.7: Net Return and Benefit Cost Ratio Analysis of Different Cropping Patterns in the Study Area (Tk./bigha)

Cropping Pattern	A	B	C	D	E	F
	GR	T VC	TC	G M (A-B)	NR (A-C)	BCR (A/C)
<i>Aus - T. Aman - Boro</i>	34,622	22,078	28,671	12,544	5,952	1.21
<i>Aus - T. Aman- Potato</i>	50,563	30,574	37,769	19,988	12,793	1.34
<i>Aus- T. Aman – Mustard</i>	29,816	17,170	23,221	12,647	6,595	1.28
<i>Jute - Vegetables - Wheat</i>	57,465	29,956	38,144	27,508	19,321	1.51
<i>Maize - T. Aman – Potato</i>	56,748	33,298	40,685	23,450	16,063	1.39
<i>Jute - T. Aman – Wheat</i>	36,797	21,614	29,254	15,183	7,543	1.26
<i>Jute - T. Aman – Potato</i>	54,047	32,110	40,126	21,938	13,921	1.35
<i>Vegetables - T. Aman- Spices</i>	73,732	35,792	43,915	37,940	29,817	1.68
<i>Vegetables -T. Aman- Vegetables</i>	75,864	36,436	44,682	39,428	31,182	1.70

Source: Author's calculation

#### 4.5 Net Return and Benefit Cost Ratio Analysis of Groups of Crops

Table 4.6 presents net return and BCR of groups of crops in the study area. It is found that net returns of non-rice crops are higher than that of cereal crops. Net return of vegetables is higher which is Tk.14,320 followed by spices Tk.12,955, maize Tk.4,034, oilseed Tk.3,289 whereas net return of paddy is Tk.2,395. Similarly, BCR of vegetables is higher than that of.

#### 4.6 Net Return and Benefit Cost Ratio Analysis of Different Cropping Patterns in the Study Area

Different farms include different crops in their cropping patterns and returns from the different patterns are different. By calculating net return and BCR of different cropping patterns, comparisons are made among the patterns towards the economic viability of them.

### 5. Conclusion

It is found from the study that most of the farmers in the study area grow different types of crops. In the study area, proportion of rice crops area to gross crop area is less than that of national level. This indicates that the area is mediocre crop

diversified area. Among the sample districts, Rajshahi is the most crop diversified area and grows the highest number of crops. Similarly, on average, yield of vegetables is higher in Rajshahi whereas yield of rice is higher in Thakurgaon in the study areas. Average yield of spices in Rajshahi is the highest in the study area. In farming activities, labor cost of a farm is considered as income of the family. Labor cost of crop production is the highest amongst the inputs costs. On average, labor cost of a crop is one fifth to two fifths of the total cost. Average labor cost for growing vegetables, spices and jute is higher than that of other crops. These indicate that these types of crops generate more employment than that of other crops. Net return of vegetables and spices are significantly higher than those of rice wheat and maize. In terms of cropping pattern, vegetables, spices base cropping pattern offer more returns than that of rice based cropping pattern. Again, non-rice crops especially vegetable, spices and jute create more employment generation than that of cereal, especially rice. Therefore, considering different aspects of crop production, this study concludes that vegetables, spices, potato based cropping patterns are economically more viable than others. As growing non-rice crops are more profitable than that of rice, this study offers following recommendations to promote practice of crop diversification in Bangladesh.

1. As higher numbers of crops grow in *Rabi* season than that of other seasons, *Rabi* season should be used to produce different types of non-rice crops. In *Rabi* season, various non-rice crops like vegetables, spices and other shorter duration crops should be grown in accordance with land quality.
2. As rice monoculture has many adverse effects on the environment, farms should include at least one non-rice crop in their cropping pattern. Similarly, some portion of cultivable land should be allocated for producing spices. Likewise, a shorter duration leguminous crop should be grown between early *aman* and late *boro*.
3. Proper facilities to non-rice crops production like supplying of quality seeds, supplying of fertilizer and insecticides, and also the irrigation equipments should be provided with reasonable subsidy by the relevant organizations of the government.

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## An Economic Analysis of Tenancy Situation in Selected Areas of Mymensingh

MD. NAZRUL ISLAM\*

**Abstract:** *In this study an attempt is made to explain the incidence of sharecropping system in two villages of Mymensingh district. The present study was based on field survey. Two sample villages namely Noudar and Salimpur in Mymensingh district were selected for the purpose of the study. Of the 27 farmers 12 farmers were selected from Noudar and 15 farmers were selected from Salimpur. Data were collected by interview method. Data were analyzed by using tabular and statistical techniques. The analytical techniques used by the study included arithmetic mean, percentage, ratio etc. in case of need, secondary data were also used in the study. The major findings of the study are: (i) poor farmers rented out no land, but middle farmers rented out more land than rich and small farmers, (ii) small and poor farmers in both villages sharecropped in more land than middle and rich farmers, (iii) in the study areas 20 percent of the sample households sharecropped out land to their relatives, (iv) in the study areas more than 75 percent of the sample households rented in land because they have sufficient able-bodied male members in the family, (v) net land leasing is negative in both the villages. In view of the above findings, the following suggestions for policy implications emerge: (i) in order to protect the tenants legal institutional and administrative measures should be taken by the authority (ii) the need for tenancy reforms is necessary in rural Bangladesh.*

### Introduction

In rural Bangladesh the most important tenancy is sharecropping. Under sharecropping system agricultural output is shared equally between landowners and sharecroppers. Adam Smith recognized that the sharecropping would

\* Professor, Department of Economics, Jatiya Kabi Kazi Nazrul Islam University, Trishal, Mymensingh.

ultimately disappear. Georgescu-Roegen (1969) and Bhaduri (1973) who stated that the institution of share tenancy as a feature of pre capitalist mode of production and this system was considered to be a barrier of modern technology and means of exploitation of sharecroppers by landowners. On the other hand, Bardhan and Srinivasan (1971), Bardhan (1976) did not consider tenancy as a barrier to modern technology. The demise of sharecropping was supported both by Marxist and neo- classicalists on the presumption that such demise would bring social development and eliminate inefficiency (Ali and Rowsonuzzaman, 1983). Dugupta (1998) stated that introduction of new technology has made the position of the sharecropping extremely vulnerable. Chakraborty (1981) explained that the sharecropping system has pre-dated and post-dated feudalism. The practice of share tenancy in Bangladesh is one of the widely discussed aspects of agriculture. In rural Bangladesh land tenure situation has undergone remarkable changes. The proportion of area under tenancy has increased from 17 percent of the operated land in 1983-84 to 22 percent in 1996 at rural Bangladesh (M. Hossain, 2000). M.K. Hussain (1986) stated that normally irrigators preferred to take in more land but given out less land than non irrigators did. Cheung (1969) observed that the land owners would rent-out land in to small parcels. The views reflected here were also supported by Jannuzi and Peach (1982) and Hossain (1977). We will not discuss the theoretical questions. In this study an attempt is made to explain the incidence of sharecropping system in two villages of Mymensingh district.

### **Importance of the Study**

The results of the study may help the policy makers in making decision. The study will be helpful to the researchers for future studies of similar nature. Extension workers may utilize the findings of the study to agricultural development. The results of this study have academic importance to the teachers and the students of economics.

### **Methodology**

The study was based on field survey. Two sample villages namely Noudar and Salimpur in Mymensingh district were selected for the purpose of the study. Noudar village is situated within Poura Corporation of Trishal and Salimpur is situated outside the Poura Corporation. Total 27 sample farmers from two villages were randomly selected. Of the 27 farmers 12 farmers were selected from Noudar and 15 farmers were selected from Salimpur. Data were collected by

interview method data were analyzed using tabular and statistical technics. The duration of data collection was December 2016 to March 2017. In case of necessary, secondary data were also used in the study. Secondary data were collected from different official document and non-official sources.

### **Results and Interpretations**

Here we will explain the incidence of sharecropping in two villages. For the purpose of the study, respondents of the study areas were divided in the following six groups. There groups are : (i) 0.10 – 0.99 acres (ii) 1.00-1.99 acres (iii) 2.0 - 2.99 acres (iv) 3.0-3.99 acres (v) 4.00-4.99 acres (vi) 5 acres and above.

For the purpose of anlysis, respondents were divided in to four groups. These groups are as follows: poor farmers having land between 0.1 and 0.99 acres (ii) small farmers : having land between 1.0 and 2.99 acres (iii) Middle farmers : having land between 3.0 and 4.99 acres (iv) Rich farmers : having land between 5.0 acres and above group.

Household Renting out land on a sharecropping Basic:

Table 1, Table 2, Show that in Noudar village out of 5 households only one household surveyed belong to 2.0 to 2.99 acre group accounted for 13.73 percent o the total rented out land. But in salimpur village it was only 7.4 percent the total rented out land. Again in Noudar 2 of the 5 households with 3.0 to 3.99 acre group sharecropped out 31.37 percent of the total sharecropped out land. While 2 of the 5 household with 3.0 to 3.99 area group rented out 25.93 percent of total rented out land in Salimpur. Only one of the household with 4.0 to 4.99 acre group rented out 27.45 percent of the total rented out land in Noudar. But in Salimpur only one household with same acre group sharecropped out 37.04 percent of total sharecropped out land. In Nouder only one household with 5 acre and above acre group rented out 27.45 precent. But in Salimpur out of 5 household only one household with sanse acre group rented out 29.63 percent of the total rented out land.

Of the 15 households in Noudar that own agricultural land only 5 households sharecrop land out. Of the 36.15 acres of land which the 15 households own only 2.55 acres are rented out (7.1%). While in Salimpur of the 15 households that own land, 5 households rent out land of the 33.7 acres of agricultural land which the 15 households own, 2.7 acres are sharecropped out (8%).

It is evident that middle farms rented out more land than rich and small farms. But poor farms rented out no land.

### **Households Renting in Land on a Sharecropping Basis**

Table 1,2 show the households renting in land at the study areas. In Noudar 12 households sharecropped in land 8.9 acres. This amount forms 24.62% of the total cultivated land. While 14 sample household sharecropped in 9.56 acres of agriculture land in Salimpur. This amount forms 28.37% of the total cultivation land. The percentage in Salimpur was higher. Table : 1,2 show that in Noudar out of 12 households 4 households surveyed belong to 0.1 to 0.99 acre group accounted for 41.57 percent of the total rented in land. But in Salimpur out of 14 household only 3 households with 0.1 to 1.99 acre group in 35.15% of the total rented in land. Again in Noudars 5 of the 12 households with 1.0 to 1.99 acre group sharecropped in 42.7 percent of the total sharecrooped in land. While 4 of the 14 households with the same acre group sharecropped in 39.33 percent of the total sharecropped in land in Salimpur. In Noudar out of 12 households only 2 households with 2.0 to 2.99 acre group sharecropped in 13.48 percent of the total sharecropped in land. But in Salimpur 4 of the 14 households with 2.0 to 2.99 acre group sharecropped in 18.31 percent of the total sharecropped in land.

Although 2 of the 14 households with 3.0 to 3.99 acre group in Salimpur sharecropped in 5.23 percent of the total sharecropped in land. It can be seen in Noudar out of 12 households only one household with 5 acres and above group sharecropped in about 2.25 percent of the total sharecropped in land. Where as, in Salimpur out of 14 households only one household with 5 acres and above group sharecrooped in nearly 2.09 percent of the total sharecropped in land.

It evident that in small and poor farmers in both villages sharecropped in more land than middle and rich farms (Table 3,4 ). It also appears that small farmer in Salimpur sharecrooped in more land than that of Noudar. Thus the net land leasing = (total sharecropped out land – total sharecropping in land) in Noudar is – 6.35 acres while it is 6.86 acres in salimpur. In the study areas net leasing is negative. It appears that in the study areas net land leasing is negative for poor and small farmers, which indicates that poor and small farmers sharecropped in more land than they sharecropped out. While, the net land leasing is positive for middle and rich farmer, which implies that the middle and rich farmers sharecropped out more land than they sharecropped in. In fact, net land leasing is negative in both villages. The amount of land under sharecropping out is less than under sharecropping in, which indicates that farmers in the study areas sharecropping in land from other villages.

### **Reasons for Renting out land**

Now, we attempt to analysis the causes for renting out (sharecropping out) land. Reasons for sharecropping out land are listed in table 5. Table 5 shows in Noudar that 20 percent sample households that sharecropping the land out was that land were far away from their home. In Salimpur 40 percent sample households sharecropping out land because the landowner have not sufficient able bodies male members in the family, Nearly 60 percent sample household in both villages sharecropped out land because they engaged in other gainful jobs in rural areas. Other jobs in rural areas are more lucrative for them. The views reflected here also supported by Janson (1987). Meanwhile in the study areas 20 percent sample households sharecropped out land to their relatives. Janson (1987) found that 22 percent land rented out to the relatives Hossain (1986) observed that only 36 percent of land rented out to relatives.

### **Reasons for Renting in Land**

Now we attempt to analyze the causes for renting in land. Reasons for renting in land are listed in Table-6. In the study areas more than 75 percent of the sample households rented in land because they have sufficient able-bodied male members in the family. The views reflected here were also supported by Janson (1987). In Noudar more than 16 percent of the tenants and in Salimpur 14 percent reported that no alternative job opportunity as the reason of rent in land. In the study areas we find that the rich farmers sharecropped in the less land but other farmers would like to sharecrop in more land. In Noudar, 8.33 percent of rich farmers renting in 2.25 percent of other's land. On the other hand, in Salimpur 7.14 percent of the rich farmer renting in 2.09 percent of other's land. The main reason is likely that rich farmers in the study areas are more concern about the rent income and prefer to sharecropping in land to extract surplus by using mechanized irrigation and other modern inputs.

### **Conclusions and Recommendations**

In rural Bangladesh the most important form of tenancy is sharecropping. In the study areas about 60 percent of the households sharecropped land out because they engaged in other gainful jobs in rural areas. Other jobs in rural areas were more lucrative for them. About 20 percent households of both villages, renting out land to their relatives. In the study areas more than 75 percent households rented in land because they have sufficient able-bodied male members in the family. In Noudar village, about 8.33 percent of the rich farmers renting in 2.25 percent of

Table 1: Incidence of Land Leasing by Different Size Groups in Noudar

Size Group (in acres)	No of H.H.s	%of H.Hs	Cultivable owned land (in acres)	% of Cultivable owned land	No. of H.Hs	% of H.Hs	Share Cropped in land (in acres)	%of Share cropped- in land	No of H.Hs	%of H.Hs	Share Cropped- out Land (In acres)	% of share cropped our land	Operated land (in acres)
0.1-0.99	5	33.33	4.30	11.89	4	33.33	3.70	41.57					8.0
1.0-1.99	4	26.67	7.50	21.85	5	41.67	3.80	42.7					11.7
2.0-2.99	2	13.33	5.70	15.77	2	16.67	1.20	13.48	1	20	.35	13.73	6.55
3.0-3.99	2	13.33	7.70	21.30					2	40	.80	31.37	6.9
4.0-4.99	1	6.67	4.80	13.28					1	20	.70	27.45	4.1
5.0 acres and above	1	6.67	5.75	15.91	1	8.33	0.20	2.25	1	20	.70	27.45	5.25
<b>Total</b>	<b>15</b>	<b>100</b>	<b>36.15</b>	<b>100</b>	<b>12</b>	<b>100</b>	<b>8.9</b>	<b>100</b>	<b>5</b>	<b>100</b>	<b>2.55</b>	<b>100</b>	<b>42.5</b>

Field Survey-2017



Table 2: Incidence of Land Leasing by Different Size Groups in Salimpur

Size Group (in acres)	No of H.H.s	% of H.Hs	Cultivable land (in acres)	% of Cultivable owned land	No. of H.Hs	% of H.Hs	Share Cropped in land (in acres)	% of Share cropped-in land	No of H.Hs	% of H.Hs	Share Cropped- out Land (In acres)	% of share cropped our land	Operated land (in acres)
0.1-0.99	3	20.0	1.42	4.29	3	21.43	3.36	35.15					4.78
1.0-1.99	4	26.67	6.35	19.20	4	28.57	3.75	39.23					10.1
2.0-2.99	4	26.67	8.75	26.46	4	28.57	1.75	18.31	1	20	.20	7.4	10.
3.0-3.99	2	13.33	6.75	20.41	2	14.29	0.50	5.23	2	40	0.70	25.93	6.5
4-4.99	1	6.67	4.0	12.10					1	20	1.00	37.04	
5 acres and above	1	6.67	5.8	17.54	1	7.14	.20	2.09	1	20	0.80	29.63	5.2
	15	100	33.7	100	14	100	9.56	100	5	100	2.7	100	5.2

Field Survey 2017

Table 3: Sharecropped-in land and Sharecropped-out land Different Size Groups in Noudar

Land Holding (in acres)	No of H.Hs	%H.Hs	Share cropped in land (in acres)	% of Share cropped-in land	No of H.Hs	% H.Hs	Sharecropped-out land (in acres)	% of Share Cropped Out land	Net land leasing (acres)
Poor farmer (0.1-0.99)	4	33.33	3.7	41.57					-3.7
Small farmer (1.0-2.99)	5	41.67	3.8	42.7	1	20	.35	13.73	-3.45
Middle farmer (3.0-4.99)	2	16.67	1.20	13.48	3	60	1.50	58.82	0.30
Rich farmer (5 acres and above)	1	8.33	0.20	2.25	1	20	0.70	27.45	0.50
	<b>12</b>	<b>100</b>	<b>8.9</b>	<b>100</b>	<b>5</b>	<b>100</b>	<b>2.55</b>	<b>100</b>	<b>-6.35</b>

Table 4: Sharecropped- in Land and Sharecropped-out land Different Size Groups in Salimpur

Land Holding (in acres)	No of H.Hs	% H.Hs	Share cropped in land (in acres)	% of Share cropped in land	No of H.Hs	% H.Hs	Sharecropped out land (in acres)	% of Share Cropped Out land	Net land leasing (in Acres)
Poor farmer (0.1-0.99)	3	21.43	3.36	35.15					-3.36
Small farmer (1.0-2.99)	8	57.14	5.50	57.53	1	20	0.20	7.41	-5.3
Middle farmer (3.0-4.99)	2	14.29	0.50	5.23	3	60	1.70	62.96	1.2
Rich farmer (5 acres and above)	1	7.4	0.20	2.09	1	20	0.80	29.63	0.6
<b>Total =</b>	<b>14</b>	<b>100</b>	<b>9.56</b>	<b>100</b>	<b>5</b>	<b>100</b>	<b>2.7</b>	<b>100</b>	<b>-6.86</b>

Field Survey 2017

*Table 5: Reasons for Renting Out : Frequencies of Responses*

Reasons for renting out land	Noudar Village		Salimpur Village	
	No of Households	% of households	No of Households	% of households
1. No. of able adult person	-	-	01	20
2. Engage in other gainful job	03	60	03	60
3. Distant land	01	20	-	-
4. To help relatives	01	20	01	20

Field Survey 2017

*Table 6: Reasons for Renting in: Frequencies of Responses*

Reasons for renting in land	Noudar Village		Salimpur Village	
	No of Households	% of households	No of Households	% of households
1. Sufficient able-bodied members.	09	75	11	78.57
2. Extract surplus by using modern inputs.	01	8.33	01	7.14
3. Lack of alternative job opportunities.	02	16.67	02	14.28
	12	100.00	14	100

Field Survey 2017

other's land. But in Salimpur only 7.14 percent of the rich farmers renting in land 2.09 percent of other's land. The major reason is likely that the rich farmers in both the villages are more concern about the rent income and prefer to extract surplus by using modern irrigation and agricultural inputs. In the study areas, net land leasing is negative. The amount of land under sharecropping out is less than under sharecropping in which implies that farmers in the study areas sharecropping in land from other villages. In order to protect the tenants legal institutional and administrative measures should be taken by the authority. The need for tenancy reforms is necessary in Bangladesh. Particular emphasis should be given to protect the rights of tenants in rural areas.

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## Determinants of and Barriers to Adaptation: Evidence from Hazard-prone Rural Households in Bangladesh

G M MONIRUL ALAM\*

**Abstract:** *Understanding the factors that shape resource-poor households' heterogeneity in adopting adaptation strategies is crucial to reduce vulnerability. This paper employs a logit model to analyse factors that influence household adaptation choices and the barriers to adaptation by using the survey data of riverbank erosion-prone rural households in Bangladesh. The results reveal that households are autonomously adopting adaptation strategies where migration appears to be an important adaptation strategy for small and landless farmers in particular while other important adaptation strategies are diversifying crops and varieties, planting trees and homestead gardening. Access to credit and lack of information on appropriate adaptation strategies are among the important barriers to adaptation. The model results indicate that the choice of adaptation strategies is significantly influenced by a household head's education, household income and farm category, access to institutions and social capital. Government interventions such as access to institutions and credit facilities, and a package of technologies through agro-ecological based research are required to support autonomous adaptation locally and to enhance households' resilience to better cope and adapt with climate change and hazards.*

**Keywords:** *Bangladesh, adaptation, determinants, erosion, barriers, households*

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\* Associate Professor, Faculty of Agricultural Economics and Rural Development, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706  
E-mail: gmmonirul79@gmail.com

## 1. Introduction

Bangladesh is most vulnerable to climate change (World Bank 2013; IPCC 2007) which poses a major risk to the lives, livelihoods and food security of 64% of the rural population who depend on agriculture (BBS 2012). Scholars have put a high importance on the adaptation to climate change as one policy option for reducing the adverse effects of climate change so as to protect the livelihood and food security of poor farmers (Alam et al. 2017; Alam 2016; IPCC 2014; World Bank 2013; Green and Raygorodetsky 2010; Adger et al. 2009; Lobell et al. 2008).

Adaptation strategies can be classified in different forms such as planned and autonomous (spontaneous), structural and non-structural, and hard and soft (IPCC 2001). Planned adaptation requires intervention by government and/or regional, national and international organizations to support and/or enhance responses by farmers and organizations (Alam et al. 2016a; Shaw et al. 2013). Autonomous adaptation actions are those undertaken by the affected people without planned intervention (IPCC 2007; Smit et al. 2000). These generally occur through private agents such as farmer or agricultural organizations (Alam 2016; Shaw et al. 2013; Seo 2011). Poor households' autonomous adaptation strategies are often overlooked in international and national efforts to manage the impact of climate change (Alam et al. 2016a; Christoplos et al. 2009). But these strategies can be influenced by a range of factors and that information is crucial for identifying appropriate options for enhancing adaptation. A lack of successful adaptation will make the households more vulnerable to poverty and food insecurity.

Farmers in Bangladesh have experienced a range of climatic hazards, including riverbank erosion, and have made adaptation decisions (Alam 2017; Alam 2016; Alam et al. 2016a). Elahi et al. (1991) asserted that some parts of 50 districts out of 64 in the country are subject to riverbank erosion. A loss of productive land and other natural resources on which agricultural practices depend is a common phenomenon in the riparian areas. Riverbank erosion causes the loss of land of about 8700 ha and the displacement of approximately 200 000 people along the estimated 150 000 km of riverbanks annually (CEGIS 2012; GoB 2010). Households in erosion-prone areas are among the poorest of the poor and are subject to persistent poverty and food insecurity (IFAD 2013; GoB 2010). These resource-poor households are also prone to other climatic hazards such as flooding and waterlogging due to their proximity to the river which also contributes to their increased vulnerability. So, some argue that adaptation research should focus on the most vulnerable groups or those with the least adaptive capacity (Hulme et al. 2011; IPCC 2007).



Despite increasing recognition of the need of adaptation to reduce rural households' vulnerability, limited research has been conducted on adaptation in Bangladesh (see Section 2). Hazard-prone resource-poor households' adaptation strategies, the factors influencing autonomous adaptation and the barriers to adaptation have not been explored so far. These are crucial to formulating and implementing an effective and sustainable adaptation policy in Bangladesh. Moreover, recent literature has indicated that farmers' access to various institutions (Alam et al. 2016a; Alam 2015; Alauddin and Sarker 2014) and their social capital (i.e., social connection) play crucial roles in their adaptation decisions (Deressa et al. 2009). This issue has particular importance for the resource-poor rural riparian communities where the availability of institutional services and social connection among farmers seems to be limited due to the fragile infrastructure and low livelihood status. Action like government intervention is crucial in ensuring sustainability of farm-level autonomous adaptations (Alam 2016; Stringer et al. 2009; Smit and Pilifosova 2001).

This research using cross-sectional survey data from two riverbank erosion-prone districts in Bangladesh provides information on resource-poor households' adaptation strategies with new insights on the determinants of the households' choice of adaptation and the barriers to their adaptation. The research questions posed to investigate this are: (i) what are the main adaptation strategies that the resource-poor households adopt?; (ii) what are the barriers to adaptation?; and (iii) what are the determinants influencing adaptation strategies?

The remainder of the paper is organized as follows: a review of relevant empirical evidence is presented in section 2; section 3 presents the background of the study area, the data collection procedure and a description of the data and model; the results are discussed in section 4; and sections 5 provides a summary and some policy guidelines.

## **2. Review of literature**

This section provides a summary of the existing research on climate change adaptation and the factors influencing adaptation. The ability and capacity to adapt are influenced by system characteristics (e.g., agro-ecological) that are called the 'determinants of adaptation' (Smit et al. 2000). Understanding the determinants of adaptation is crucial to explaining the local autonomous adaptation process. This knowledge assists policy development by strengthening adaptation through investing in these factors (Yohe and Tol 2002).

Although the impact of climate change in Bangladesh is not limited to the occurrence of droughts, most of the adaptation strategies are drought focused (see, for example, Alam 2015; Alauddin and Sarker 2014; Sarker et al. 2013; Habiba et al. 2012; Shahid and Behrawan 2008; FAO 2006). A few studies have focused on its low-lying and saline-prone areas (Rashid et al. 2014; Islam et al. 2014; Anik and Khan 2012; Rawlani and Sovacool 2011; Ayers and Huq 2008). Various determinants of adaptation strategies have been identified using a multinomial logit model. Alam (2015) indicated that farmers with more experience of farming, better schooling, and access to electricity and institutional facilities would have an increased likelihood of adopting alternative adaptation strategies in the drought-prone Rajshahi district. Alauddin and Sarker (2014) showed a household head's education level, farm size, access to climate information, electricity for irrigation, agricultural subsidies and severity of drought were significant factors underpinning the farmers' decision to adopt adaptation strategies in drought-prone areas in Bangladesh. Sarker et al. (2013) found that the household head's gender, age, education, household income, farm size, farmer-to-farmer extension, and access to credit, subsidy and electricity were the main determinants of an adaptation strategy in the Rajshahi district.

Empirical results suggest that riverbank erosion has catastrophic impacts on the lives and livelihood of riverine households in Bangladesh (Alam 2017; Alam et al. 2017; Alam 2016; Penning-Rowsell et al. 2013; Lein 2010; Hutton and Haque 2003; Zaman 1991; Haque 1997; Hossain 1993). So far there is no in-depth empirical research on adaptation strategies and the factors influencing the autonomous adaptation of hazard-prone resource-poor rural households. Place-based climate adaptation studies have received much theoretical discussion in recent years (Groulx et al. 2014; Fresque-Baxter and Armitage 2012). Eisenack (2009) argued that autonomous adaptation is not sufficient to reduce the risk of climate change. The factors that contribute to the adaptive capacity of households could allow government intervention to target the right groups of people and to formulate and implement an effective and sustainable adaptation policy in the country.

### **3. Methodology**

#### *3.1 Selection of study area*

A multistage sampling technique was employed to collect data from riverbank erosion-prone areas in Bangladesh. The riverbank erosion affected districts,

upazilas<sup>1</sup> and affected riverine villages were first selected purposively based on the degree of severity of erosion that was identified through a review of literature, reports in the newspapers and in consultation with experts. Respondents were selected randomly from each village. For the field survey, the Chauhali upazila of the Sirajgonj district and the Nagarpur upazila of the Tangail district were selected (Figure 1). About 200 km north of Dhaka, the capital of Bangladesh, these areas represent one of the most erosion-prone riparian environments in the country. The Jamuna river which is reported to cause bank erosion of around 2000 ha per year (CEGIS 2012) crosses the study area. Data were collected from six riverine villages– Kashpukuria, Moradpur, Kairat, Datpur, Kashkawalia and Atapara.

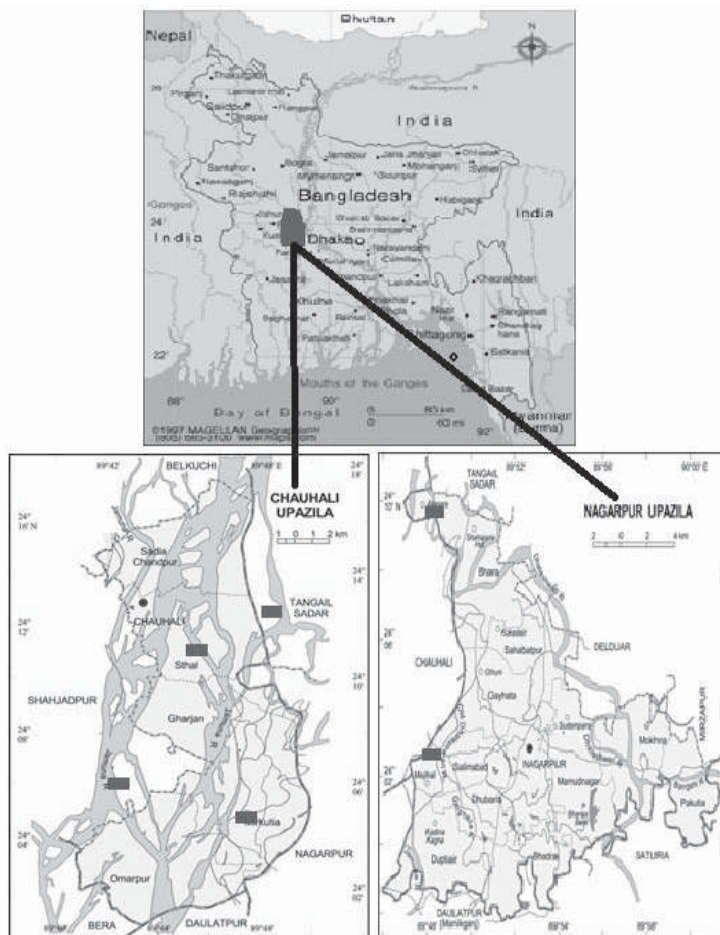


Figure 1: The study area: the Chauhali and Nagarpur Upazilas in Bangladesh.

<sup>1</sup>. Lower administrative unit of the government; below district level but above village level.

### 3.2 *Sampling, questionnaire and data collection*

A complete list of riverine households in the selected villages was collected from the Department of Agricultural Extension. To make a representative sample size, 15% of households from each village were selected which gives a sample size of 380 households for the study. It is worth mentioning that a sample size of 350 is considered to be the optimal size for a structured interview in quantitative research (Perry 1998). In addition, 5% of the population has been regarded as a sufficiently large sample size for survey research (Bartlett et al. 2001). To ensure the randomness in the sampling, a computer-generated random number table was applied to the list to select the 380 households. The unit of analysis was the rural household<sup>2</sup> and the household head (either male or female) was the survey participant for the data collection.

Data were collected using face-to-face interviews between January and May 2014. Before the final data collection commenced, a structured survey questionnaire was tested with 20 respondents to ensure the adequacy of the information obtained and to avoid any ambiguity of questions. Moreover, one focus group discussion was conducted in each village with a group of 10–12 household heads to obtain their views on various climatic and socio-economic variables. These opinions were used to cross-validate the information obtained from the survey and the key informants. In case of a non-response<sup>3</sup>, the interviewers proceed to the next household until the required number of respondents for a particular village was reached. Due to the smallness of the land holdings, the study households were categorized as: large farm household (45) (>2.5 acres), medium farm household (107) (1.5–2.49 acres), small farm household (127) (1.49–0.5 acres) and landless (101) (<0.5 acres).

### 3.3 **Data description**

#### 3.3.1 *Socio-demographic characteristics*

Table 1 provides details of the socio-demographic characteristics of the households. In summary, the results are:

- About 29% of the households had no schooling. The average education level was below primary level (3.17 years; Table 1). More than 46% of the

<sup>2</sup>. A household (economic agent) is understood as a domestic unit and household heads have the power and decision-making authority over the household's resources (Ellis 1988).

<sup>3</sup>. Unavailability of respondents or refusal to answer questions were mainly in female-headed households (<2% of the actual sample).

households had more than five members and the average family size was 5.21 which is slightly higher than the national average of 5 (BBS 2012).

- The average household income is estimated at Tk 35 000 per year<sup>4</sup>. The standard deviation of household income is fairly large indicating a wide range of variability among the households.
- The average land holding of the households was 0.56 acres (small farms are common in Bangladesh). About 27% of the households were landless.
- The respondents had limited access to institutions for credit. About 69% of the households reported no access to government financial institutions and 54% had no access to non-government organisations (NGOs).
- The social network, the key to social capital, was found to be limited. About 59% of the households had no contact with the extension service providers from whom they can obtain advice related to agriculture and rural development. They also had less farmer-to-farmer contact (64%) and less involvement with different organizations, including membership of cooperative societies (35%), from whom they can receive information.

*Table 1: Summary statistics*

Explanatory variables	Description	Mean	Std
Age	Years (continuous)	45.12	14.43
Education	Years of schooling (continuous)	3.17	4.63
Gender	Dummy, 1 = male, 0 = female	0.95	0.22
Average household income	Bangladeshi Taka (continuous)	35000	38456
Large farmer (N = 47)	Dummy, 1 = large farmer, 0 = otherwise)	0.23	0.32
Medium farmer (N = 119)	Dummy, 1 = medium farmer, 0 = otherwise)	0.44	0.33
Small farmer (N = 131)	Dummy, 1 = small farmer, 0 = otherwise)	0.63	0.46
Landless (N = 83)	Dummy, 1 = small farmer, 0 = otherwise)	0.68	0.48
Institutional access index	Continuous	1.36	0.89
Social capital index	Continuous	0.67	0.45

<sup>4</sup>. Taka (Tk) is the Bangladesh currency, US\$1 = Tk78.03 as on 1 March 2017.

### 3.3.2 Households' adaptation strategies

All of the households responded positively to undertaking adaptation measures based on their long-term knowledge, experience and perceptions to address the adverse effects of riverbank erosion hazard and other climate change issues. Households adopted at least one form of adaptation from the various adaptation options to sustain their farming and livelihood. An initial 15 adaptation strategies were identified through the focus group discussions. However, these failed to generate statistically significant parameters in the logit estimation. Therefore, following Alam (2015), Alauddin and Sarker (2014) and Sarker et al. (2013) the adaptation strategies were reorganized by grouping closely related choices into the same category for the model estimation. Thus, diversifying crops and varieties included the cultivation of pulses, spices and oil seed, and the cultivation of wheat and HYV rice varieties (e.g., BRRI-28, BRRI-29). Adjusting planting time and techniques included the cultivation of aman and aus rice, and vegetables. Diversifying income sources included livestock, poultry and duck rearing, small business and off-farm employment. Small and landless farmers were found to adopt seasonal migration, especially during the rainy seasons when there was limited scope of both farming and non-farming employment to improve their livelihood and food security. Tree plantation was practiced mainly by large and medium farmers who had sufficient land. The adaptation strategies of the households resulted in six main outcomes (Figure 2).

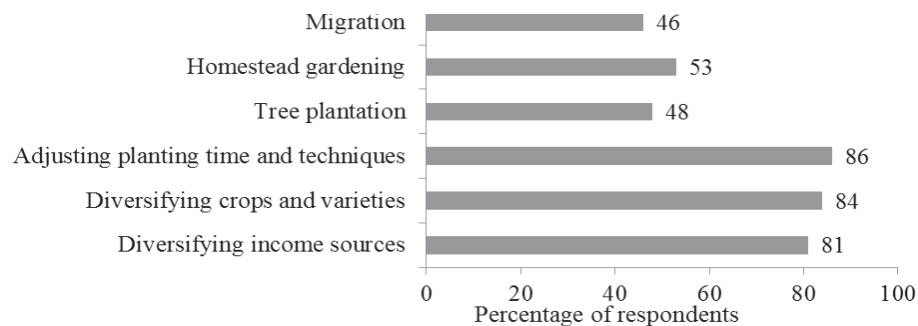


Figure 2: Main adaptation strategies of households.

### 3.3.3 Barriers to adaptation

Although the households were adopting adaptation strategies, they reported some barriers that prevented them from adapting successfully. The main barriers were the lack of information about riverbank erosion and related climate issues, one's own land for cultivation, appropriate crop varieties, knowledge of appropriate

adaptation and credit facilities (Table 2). Also mentioned were other post-production related problems such as a lack of storage facilities, marketing and transportation facilities which are crucial for policy intervention.

However, the barriers were felt heterogeneously among the farming groups. For example, the main barriers to adaptation for households with relatively less land ownership were the lack of credit, own land and knowledge about appropriate adaptation: the lower average land size among these households was highly significant ( $p < 0.007$ ) compared to the households who did not mention these as a main barrier (independent sample t-test). The lack of storage and marketing facilities were mentioned mainly by the large and medium farmers as these might prevent them from getting the best price for their products. Connecting the small farmers to supermarkets could be a strategic option for both government and NGOs who are working to improve the livelihoods by enabling them better access to market. They also mentioned a lack of knowledge about appropriate adaptation strategies and transport facilities as barriers. A lack of credit is appeared to be the main barrier for small and medium farmers. A lack of institutional access and credit can limit their ability to get the resources and technologies they might need for adaptation.

Table 2: Perceived barriers to adaptation measures.

Barriers to adaptation	Response by farm category			
	Large	Medium	Small	Landless
Lack of information about riverbank erosion and related climatic issues	xx	xx	xx	xx
Lack of appropriate variety of crops	xx	xx	xx	–
Lack of knowledge concerning appropriate adaptation strategies	x	x	xx	xx
Lack of credit/money/saving	–	x	xx	xx
Lack of suitable land for cultivation	–	–	xx	xx
Lack of own land	–	–	xx	xx
Lack of storage facilities	xx	xx	–	–
Lack of marketing facilities	xx	xx	xx	–
Lack of transportation facilities	x	x	x	–

Where, xx= main barriers, x = barriers

Where, xx= main barriers, x = barriers

### 3.4 Econometric modelling

#### 3.4.1 Theoretical and empirical model

The econometric analysis is based upon the random utility theory (Verbeek 2004). The households' choice of adaptation strategies is discrete and mutually exclusive. The farmers in this study are assumed to select from the 15 alternatives those which have the highest utility.

Assuming  $U_{ih}$  and  $U_{ik}$  are the utility of household  $i$ , who chooses between any two alternatives, the random utility model can be written as:

$$U_{ih} = V_{ih} + \varepsilon_{ih} \dots\dots\dots(i)$$

$$U_{ik} = V_{ik} + \varepsilon_{ik} \dots\dots\dots(ii)$$

where,  $U_{ih}$  and  $U_{ik}$  are an individual household's utility (i) of choosing option  $h$  and  $k$ , respectively, and  $V_{ih}$  and  $V_{ik}$  imply the deterministic (observable or explainable) or systematic component of utility. Whereas,  $\varepsilon_{ih}$  and  $\varepsilon_{ik}$  represent the stochastic (random or unexplainable) element that stands for unobservable influences on individual choices and measurement error, and are assumed to be independently and identically distributed (Greene 2012). According to utility maximization behaviour, a household will only choose an option  $h$  if  $U_{ih} > U_{ik}$  for all  $h \neq k$ .

The deterministic components  $V_{ih}$  or  $V_{ik}$  represent an attribute vector  $x$ , i.e.  $V_{ih} = x'_{ih}\beta$  or  $V_{ik} = x'_{ik}\beta$ . However, utility is not directly observable; rather, a household's choice of adaptation strategies can be observed. When there are many choices, the likelihood of alternative adaptations can be expressed as a probability:

$$Pr[Y_i = h|x] = P[U_{ih} > U_{ik}] = Pr[x_i\beta_h + \varepsilon_{ih} - x_i\beta_k - \varepsilon_{ik} > 0|x]$$

$$= Pr[x_i(\beta_h - \beta_k) + \varepsilon_{ih} - \varepsilon_{ik} > 0|x] = Pr[x_i\beta + \varepsilon > 0|x] \dots\dots\dots(iii)$$

where,  $\beta$  is a vector of unknown coefficients and  $x$  is the vector of the explanatory variables influencing the choice of adaptation and  $\varepsilon$  is a random error term. For a given  $x$  the probability that a household will choose an alternative  $h$  is given as follows:

$$Pr(Y_i = h/x) = \frac{e^{\beta_h x_i}}{1 + \sum_{k \neq h} e^{\beta_k x_i}} \dots\dots\dots(iv)$$

Equation (iv) can be estimated by choice models (Greene 2012). To obtain unbiased and consistent parameters in the model, the assumption of Independence of Irrelevant Alternatives (IIA) must be fulfilled (Cameron and Trivedi 2009). It indicates that the probability of adopting a particular adaptation strategy by a



given farm household requires independence from the probability of selecting another adaptation strategy.

Different choice models – multinomial probit (MNP) or multinomial logit (MNL) – can be constructed based upon the assumed distribution of the random disturbance terms. MNL provides a more precise estimation than the MNP (Kropko 2007). Moreover, estimation of MNL is simpler and interpretations of parameter estimates are easier (Cameron and Trivedi 2009; Long 1997). However, the estimated parameters of MNL only show the direction of the impact of the explanatory variables on the dependent variable and do not provide the extent of change or the probabilities. Marginal effects measure the impact on the probability of observing each of several outcomes rather than the impact on a single conditional mean and are more meaningful and interpretable (Cameron and Trivedi 2009; Long 1997). To compute the marginal effects of different exogenous variables, we differentiate equation (iv) with respect to N explanatory variables as follows:

$$\frac{\partial P_{nm}}{\partial x_n} = P_{nm}(\beta_{nm} - \sum_{j=1}^{J-1} P_{nj}\beta_{nm}) \dots\dots\dots(v)$$

Marginal effects measure the likelihood of change in the probability of the adaptation of a particular choice with respect to a unit change in an explanatory variable (Greene 2012). The MNL model can be regarded as simultaneously estimating binary logits for all possible comparisons among the outcomes. With Z outcomes, only Z-1 binary logits need to be estimated.

### 3.4.2 Specification of variables

The selection of explanatory variables in this study is based on the review of the literature, the focus group discussions and field experience. We assumed household adaptation strategies are a function of a household's socio-economic and farm characteristics such as the age, gender and education of the household head, household income and farm size, access to climate information and other institutions, and social capital.

Some authors have argued that social capital and access to various institutions have crucial roles in enabling households to adjust their management practices (Alam et al. 2016a; Alam 2016; Alam 2015; Wood et al. 2014; Deressa et al. 2011; Deressa et al. 2009; Smit and Wandel 2006). Jordan (2015) argued that social capital can increase a household's resilience and can be used for more forward-looking adaptations. Therefore, indexes of social capital and access to various institutional facilities were constructed. The components of the institutional

access index are: (i) access to market (input and output), (ii) financial institution for credit, (iii) agricultural extension services, (iv) information on climate and weather conditions, and (v) off-farm employment opportunities. The social capital index includes farmer-to-farmer extension, organizational involvement of the household heads and women members. The respondents replied ‘yes’ or ‘no’ to the questions on these components and the score was provided to make the index.<sup>5</sup> The higher the index value the higher the likelihood of the adoption of that particular adaptation strategy. The variables and summary statistics are presented in Table 1.

### 3.4.3 Model diagnosis

The problems of multicollinearity, heteroskedasticity and the effect of outliers in the variables are usually associated with cross-sectional survey data. We examined collinearity using the correlation matrix with all the explanatory variables. The correlations are found to be relatively low (<0.39) in all cases. In order to explore the potential multicollinearity in the model which can lead to imprecise parameter estimates (Gujarati 2003), we calculated the Variance Inflation Factor (VIF) for each of the explanatory variables. The VIFs range from 1.07 to 1.53 which does not reach to the conventional thresholds of 10 or higher used in regression diagnosis. The robust standard errors were used to tackle the problem of heteroskedasticity. The Ramsey-RESET test was also performed to test the accuracy of the models. The result rejected the null hypothesis of incorrect functional form that indicates relevant variables have not been omitted.

Endogeneity can also be a problem as its presence in the model creates bias estimates and limits the ability to make inferences about the characteristics (Wooldridge 2006). The education variable in the model could be argued to be a potential endogenous variable due to the influences of some external confounding factors, namely the Compulsory Primary Education Policy of the government of Bangladesh (Alam 2015). The endogeneity problem of the education variable in the model is examined by employing an augmented Durbin–Wu–Hausman test. Using the total educated numbers in the family as a proxy for the government policy intervention, the test result rejects the null hypothesis that the education variable is endogenous (F value 1, 1.05; Prob >0.2).

5. No weighting was used to treat the facilities equally. Weighting can be inherently biased (Wheeler et al. 2013).

## **4. Results and discussions**

### *4.1 Econometric results*

Table 3 presents the results of the MNL model of estimated parameters and marginal effects.

Overall, the model offers a good fit with factors predicting the adoption of adaptation strategies by the study households. The chi-square statistics (LR–213.43) indicate the strong explanatory power of the model. In other words, the joint null hypothesis that all variables are jointly significant is accepted. Goodness of fit of the model given by the McFadden pseudo  $R^2$  of 0.29 also indicates reasonable explanatory power of the model (Table 3). We also tested the IIA by employing the Hausman test. The test result failed to reject the null hypothesis of IIA at the 5% level (p value 0.231). Moreover, most of the explanatory variables in the model and their marginal values were found to be statistically significant with an expected sign (see discussion below).

#### *Level of education*

It is expected that household heads with more education are more likely to adopt better adaptation strategies. The study found a significant positive relationship on the adoption of diversifying crops and varieties (0.112,  $p < 0.05$ ), homestead gardening (0.019,  $p < 0.10$ ), tree plantation (0.123,  $p < 0.05$ ) and diversifying income sources (0.034,  $p < 0.10$ ). It implies that a one unit (year) increase in a respondent's level of education will increase the probability of adopting diversifying crops and varieties by 0.112 relative to the base category while the effect on the remaining options is negligible. The same interpretation holds true for the other variables. This finding supports the empirical evidence that farmers with higher educational levels were likely to adapt better to climate change in the African context (Gebrehiwot and van der Veen 2013; Deressa et al. 20011) and in Bangladesh (Alam 2015; Alauddin and Sarker 2014).

#### *Age of household head*

The age of the household head acts as a proxy for experience and so influences the adoption of adaptation strategies. We found the household head's age was a significant positive factor on adopting diversifying crops and varieties (0.012,  $p < 0.10$ ) and negative factor in adopting a migration decision (-0.105,  $p < 0.05$ ). It may be due to the fact that experienced people have good knowledge about weather and climate variability and thus adapt to this risk-aversion strategy.

Table 3: Estimated results from MNL model

Explanatory variables	Adaptation strategies (Dependent variable)											
	Diversifying crops and varieties		Homestead gardening		Tree plantation		Diversifying income sources		Migration			
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect		
Constant	-5.31** (2.441)		-3.41* (2.201)		-1.75* (0.905)		-1.23** (0.571)		-2.65* (1.361)			
Age	0.125** (0.051)	0.012* (0.013)	0.141 (0.112)	0.025 (0.017)	0.130* (0.077)	0.019 (0.031)	0.102* (0.052)	0.037 (0.025)	-0.321*** (0.121)	-0.105** (0.047)		
Education	0.313** (0.124)	0.112** (0.053)	0.065* (0.037)	0.019* (0.011)	0.071** (0.033)	0.123** (0.061)	0.093** (0.043)	0.034* (0.018)	0.071 (0.032)	0.006 (0.012)		
Gender	0.011** (0.004)	0.002** (0.001)	0.017 (0.014)	0.009 (0.021)	0.061 (0.047)	0.015 (0.012)	0.023 (0.013)	0.009 (0.011)	-0.131** (0.041)	-0.021** (0.01)		
Average household income	0.135** (0.061)	0.101** (0.047)	0.023 (0.021)	0.001 (0.000)	0.013* (0.007)	0.007* (0.004)	0.013 (0.006)	0.002 (0.000)	-0.211*** (0.056)	-0.103*** (0.031)		
Large farmers	1.128*** (0.331)	0.231*** (0.083)	0.017 (0.102)	0.005 (0.014)	0.193** (0.065)	0.074** (0.026)	0.011 (0.104)	0.000 (0.000)	-0.171*** (0.051)	-0.103*** (0.035)		
Medium farmers	0.122*** (0.039)	0.101*** (0.029)	0.023 (0.142)	0.007 (0.105)	0.103** (0.035)	0.045** (0.022)	0.027 (0.204)	0.003 (0.093)	-0.112*** (0.036)	-0.073** (0.026)		
Small farmers	0.118 (0.103)	0.072 (0.041)	0.191*** (0.061)	0.108** (0.045)	0.076 (0.045)	0.012 (0.014)	0.213*** (0.067)	0.112*** (0.036)	0.172*** (0.054)	0.094** (0.035)		

Continue

Explanator y variables	Adaptation strategies (Dependent variable)									
	Diversifying crops and varieties		Homestead gardening		Tree plantation		Diversifying income sources		Migration	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Landless farmers	0.105 (0.076)	0.051 (0.031)	0.115** (0.041)	0.073** (0.025)	0.114 (0.102)	0.065 (0.073)	0.059** (0.021)	0.023** (0.011)	0.237*** (0.067)	0.113*** (0.037)
Institutional access index	0.511*** (0.183)	0.191*** (0.072)	0.130** (0.064)	0.071** (0.034)	0.028** (0.014)	0.011** (0.005)	0.106** (0.045)	0.013** (0.006)	0.014 (0.045)	0.005 (0.012)
Social capital index	0.215*** (0.073)	0.102*** (0.04)	0.251** (0.097)	0.127** (0.055)	0.151 (0.312)	0.016 (0.145)	0.113** (0.051)	0.031* (0.017)	0.153*** (0.053)	0.119*** (0.041)
Log likelihood	-227.12									
Pseudo R <sup>2</sup>	0.29									
LR (Chi-square)	213.43 (p<0.02)									

N= 380. \*\*\*p<0.001; \*\*p<0.05 and \*p<0.10. Adjusting planting time and techniques is used as base category. Robust standard errors are indicated in parentheses.

Households with low income and resources tend to migrate for few months to improve their livelihood and food security. However, temporary migration is less likely for an aged household head (negative impact) as it represents their vulnerability. This finding is consistent with previous adaptation studies (Hisali et al. 2011; Deressa et al. 2009).

### ***Gender of household head***

This study found a significant relationship between adopting the strategies of diversifying crops and varieties (0.002,  $p < 0.05$ ) and a migration decision (-0.021,  $p < 0.05$ ) for male-headed households. This result is in accordance with our field experience. But mixed opinion exists in African context that male-headed households are more likely to take up climate adaptation strategies (Deressa et al. 2009) contrary to the findings of Nhemachena and Hassan (2007).

### ***Household income***

Household income was a significant positive factor in adopting the strategies of diversifying crops and varieties (0.101,  $p < 0.05$ ) and tree plantation (0.007,  $p < 0.10$ ) and a negative factor in adopting a migration decision (-0.103,  $p < 0.001$ ). Modern agriculture is capital intensive: more capital is required when adopting new crops and varieties, agricultural technologies and fertilizer management. This opportunity is somewhat limited for small and marginal farmers unless they get access to credit. Previous studies found a positive relationship between income and adaptation also (Alam 2015; Alauddin and Sarker 2014).

### ***Farm status***

Land ownership plays a key role in the livelihood of most of the rural households and this was expected to be a factor in increasing adaptation in farming. Large and medium farmers are relatively well resourced and more likely to adopt strategies earlier than small and landless farmers. This study found a significant positive relationship in adopting diversifying crops and varieties (0.231,  $p < 0.001$  and 0.101,  $p < 0.001$ ) and tree plantation (0.074,  $p < 0.05$  and 0.045,  $p < 0.05$ ), and a significant negative relationship in the case of a migration decision (-0.103,  $p < 0.001$  and -0.073,  $p < 0.05$ ) for large and medium farmers, respectively. It is understandable that households with sufficient land are not likely to migrate. In contrast, small and landless farmers migrate seasonally frequently (0.094,  $p > 0.001$  and 0.113,  $p > 0.001$  for small and landless farmers, respectively). They cannot generate enough income to sustain their livelihood mainly due to the lack

of employment opportunities in farming. They are more likely to adopt homestead gardening (0.108,  $p>0.05$  and 0.073,  $p>0.05$  for small and landless farmers, respectively) for the effective and sustainable use of their limited land resources. This strategy provides nutrients in their food chains and is an important source of subsequent income throughout the year. The significant positive relationship between farm size and adaptation are consistent with previous studies (Alauddin and Sarker 2014; Deressa et al. 2009).

### ***Institutional access***

We found evidence that suggests a households' access to institutional facilities greatly influences the likelihood of adopting adaptation strategy. The marginal results of the probability of adopting adaptation strategies such as diversifying crops and varieties (0.191), homestead gardening (0.071), tree plantation (0.011) and diversifying income sources (0.013) were found significant at the 5% level. The availability of information can promote adaptation through better management of crops, land, fertilizer and climate variability. Access to credit has been reported to have a significant positive impact on adaptation decisions (Bryan et al. 2009; Deressa et al. 2009). Gebrehiwot and van der Veen (2013) mentioned that access to markets can serve as a platform for providing information for farmers. Information on climate change can create awareness among farmers and increase the probability of adopting adaptation strategies (Alam 2015; Deressa et al. 2009). Our field experience suggests that small and landless farmers have limited access to institutional facilities, especially in terms of access to credit and extension services, which limits their scope to adopt adaptation strategies. Strong government intervention is required to ensure these households' access to institutional facilities.

### ***Social capital***

The study results show a highly significant role of social capital on the likelihood of adaptation strategy adoption. Social capital increases the probability of implementing the strategy of diversifying crops and varieties (0.102,  $p<0.001$ ), especially for large and medium farmers. Small and landless farmers benefit through adopting the strategies of migration (0.119,  $p<0.001$ ), homestead gardening (0.127,  $p<0.05$ ) and diversifying income sources (0.031,  $p<0.10$ ). This result is consistent with the findings that the presence of a strong kinship network can increase the adaptive capacity of farmers by providing economic, managerial and psychological help (Smit and Wandel 2006). Deressa et al. (2009) found a highly significant negative relationship between social capital and no adaptation

decision. Households have reported that access to farmer-to-farmer extension and government extension services stimulated them to cultivate in the new 'char land'<sup>6</sup> which was fallow previously. Households which adopted homestead gardening and changing profession towards livestock, poultry and duck rearing reported a positive contribution for adopting such strategies through their involvement in different organizations and NGOs. Small and landless farmers expressed an opinion that sharing and exchanging information and views with each other helped them to take the seasonal migration decision to improve their livelihood and food security.

## **5. Conclusions and policy implications**

Farm level adaptation strategies are the key to reducing climate change impact on agriculture, food production and the vulnerability of rural households. Using cross-sectional survey data, this paper has highlighted the factors influencing local autonomous adaptation strategies and the barriers to adoption by hazard-prone resource-poor rural households. The MNL model passes the assumptions of the IIA and does not suffer from multicollinearity, heteroskedasticity and endogeneity problems as confirmed by the statistical tests.

The study reveals that all of the sample households have responded at least somewhat to the hazards and other climate change issues through adopting a range of adaptation strategies depending on their socio-economic and household characteristics, and access to institutional facilities and social capital. Migration appears to be an important adaptation strategy for small and landless farmers in particular while other important adaptation strategies are diversifying crops and varieties, diversifying income sources, adjusting plantation time and techniques, planting trees and homestead gardening. The important barriers to adopting the adaptation strategies include a lack of information about riverbank erosion and related climatic issues, a lack of knowledge about appropriate strategies, unsuitable crop varieties, the limitations of one's own land and limited access to credit.

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6. Due to the dynamics of erosion some 'char land' (sandbars/sand and silt landmasses) have emerged as islands within the river channel or attached land to the riverbanks in Bangladesh. The char area covers about 5% of the total land area of the country and is occupied by about 6.5 million people (5% of the total population) CEGIS (2000).



Analyses of marginal effects indicate that household characteristics such as household heads' level of education and age, farm status and household income have a significant impact on which adaptation strategies are decided upon. Thus, investment in education and a supply of high yielding crops and varieties suitable to local conditions can be options for reducing the adverse impact of climate change and hazards, and be means to improve their livelihoods. The study also reveals that access to institutional facilities and social capital are the key factors influencing the adoption of adaptation strategies by the households. This underscores the need for strengthening the extension services in the study area and providing rural households with better information on production techniques, agronomic and land management practices, and climate change issues. Access to financial institutions and the creation of off-farm employment opportunities in riverine rural areas are also crucial to support the households in adapting to climate change at the farm level. Government organizations and NGOs can play a greater role by helping to form social organizations/clubs with the farmers (e.g., an Integrated Pest Management club) or assisting cooperative farms in these poorly resourced communities so that the adoption of adaptation strategies is likely to contribute to their successful continuation.

Adaptation strategies and intervention policies which are centralized in nature in Bangladesh need to consider local circumstances when developing new crop varieties, high-value crops and technology suitable for the emerging char land in order to accelerate the effective and logical autonomous adoption of adaptation processes. This will enhance the resilience of vulnerable households in riparian areas across Bangladesh.

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## Consistency of Second Five Year Plan (1980-85) and the Foreign Sector

MOHAMMAD ALI AKBAR\*

A Plan is not a prediction or just a mere forecast. A plan is rather primarily policy oriented. A Plan enumerates a number of objectives and provides for various investment magnitudes to realize the avowed objectives. Targets are set to realize these objectives. The second five year plan of Bangladesh also spells out a number of objectives. These objectives will be realized only when various sets and quantitative targets are found to be consistent.

Now that the draft on Second Five Year Plan (1980-85) has been completed, it is presumed that its consistency with respect to various aspects was checked. Although a number of aspects of its consistency are to be checked, this paper attempts to check the consistency of the plan in respect of growth rate and capital output ratio as well as for the entire economy where both marginal propensity to consume and marginal propensity to import are utilized as parameters, and in respect of the foreign sector.

$$\frac{d \text{ GDP}}{\text{GDP}} = \frac{d \text{ K}}{d \text{ O}} \text{ or}$$
$$\frac{d \text{ GDP}}{\text{GDP}} = \frac{d \text{ O}}{d \text{ K}} \times \frac{I}{\text{GDP}}$$

Where GDP = Gross Domestic Product

d means change, I = Investment

d K = Change in capital accumulation.

d O = Change in output

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\* Retd. Chief, Planning Commission.

The first is fairly simple and is done by using the following relationship:

Assuming incremental capital output ratio as 2.86 for overall economy, the growth rate comes approximately to 7.1 percent.

$$\frac{dY}{Y} = \frac{1}{m} \times \frac{(dE+DF+dR)}{Y}$$

Introducing the foreign sector the test has been conducted in terms of the following relationship:

$$\begin{aligned} & \frac{1}{.1023} \times \frac{(483 + 648.3 + 1076)}{17976.93} \\ \text{or} & \frac{1}{.1023} \times \frac{2207.3}{17976.93} \\ \text{or} & \frac{1}{.1023} \times .1227 \end{aligned}$$

or 1.2002 or 15% annually.

where m = marginal propensity to import. E= Export. F = Foreign Aid R= Reserve. Y = Gross domestic product. Substituting the figures in the above relationship, we get

If values are put in terms of bench mark year and terminal year difference, the

Alternative:

$$\frac{1}{.1023} \times \frac{(290 + 648.3 + 670)}{17976.93}$$

growth rate works out at 15% annually. If difference/the bench between .... year and an average of five years is taken the growth rate is slightly lower but still

$$\text{or} \frac{1}{.1023} \times .089465$$

$$\text{or} \frac{1}{.1023} \times .089465 \text{ or } 874536 \text{ or } 13\% \text{ annually}$$



gives 13% much higher than the stipulated growth rate of 7.1%. This is shown .....below:-

It appears that the growth rate is inconsistent when foreign sector's contribution is accounted to meet the overall growth rate.

Generally planning is a policy oriented exercise and hence the aim is to achieve stipulated growth rate which differs from forecast or prediction or projection. When the attempt is to achieve a targeted growth rate which in this case is 7.1 percent the numerator in the equation is to go down. This implies that either the export earning or foreign aid or reserves or all the three together have to go down. Whereas export is autonomously given and reserves are given as residual Foreign aid become crucial/ in achieving the targeted rate of growth.

The capacity to import has to go up which impels increase in the induced elements in the numerator in the equation. This means less foreign aid and more export earnings.

Structural components such as capital output ratio, investment elasticity, and initial proportion of GDP which is invested in fixed capital assets respectively high, low and low. Attempts should be made to remove the rigidity in the export

$$\frac{d Y}{Y} = \frac{(1)}{1+B+M} \frac{(d A + d X)}{Y}$$

Where B = Marginal propensity to consume and M= Marginal propensity to Import  
 d A = Change in autonomous expenditure and d X = change in export earnings.

Putting the values, we get

Alternative I.

$$\frac{1}{(1 + .88+.10)} \frac{(20010 +290)}{17976.93}$$

or  $\frac{1}{1+.88+.10} \frac{20300}{17976.93}$

or  $\frac{1}{1.98} \frac{20300}{17976.93}$

or  $\frac{1}{1.98} \times 1.129225$

or .570316

9.4% Annually.

It appears that the growth rate works out to be 9.4% annually.

Alternative II.

$$\frac{1}{(1 + .88 + .10)} \quad \frac{(14810 + 290)}{17976.93}$$

$$\text{or } \frac{1}{(1 + .88 + .10)} \quad (14810 \div 5)$$

$$\text{or } \frac{1}{1.98} + \frac{2962 + 290}{17976.93}$$

$$\text{or } \frac{1}{1.98} + \frac{(3252)}{17976.93}$$

$$\text{or } \frac{1}{1.98} \times 0.180899$$

9.1363%

sector. Foreign aid alters are subject to persuasion hence can be manipulated rather relatively easily.

Secondly, a consistency test for the entire economy may be done by utilizing the following relationship:

In alternative II parameters were kept as they were before only autonomous elements have been taken on annual basis so as ..... get a point estimate. Hence Investment in the Public sector was averaged by dividing by 5. This also works a growth rate of 9.1 percent.

These tests suggest that we could reduce the autonomous elements to a lower figure. In fact since domestic saving is low and foreign aid always suffers from uncertainty a lower volume of investment financed by domestic saving could be made in order to get a growth rate of 7 percent.

The consistency test for the entire economy may also be carried out in terms of

$$\frac{d \text{ GDP}}{\text{GDP}} = \frac{d \text{ O}}{d \text{ K}} \times \frac{\text{SP} + \text{SG} + \text{F}}{\text{GDP}}$$

Where SP = Private saving, SG = Government Saving, F = Foreign Investment.  
 Putting the values we get,

$$\frac{d \text{ Y}}{\text{Y}} = \frac{1}{2.86} \times \frac{(5160 + 6555 + 13880)}{17976.93}$$

or  $\frac{1}{2.86} \times \frac{(25,595)}{17976.93}$

or  $\frac{1}{2.86} \quad 1.429769$

= 0.497821 or 8.5 % annually.

savings and investment; because the growth rate of the economy depends as much on investment as on savings. There are two aspects of saving safely, Government saving and private savings. The following relationship can be utilized to check consistency in the growth rate in terms of savings.

It appears that the growth rate is higher than that was envisaged in the Plan. This implies that the numerator in the equation can be reduced further. In fact we can probably decrease foreign Investment and adopt policies to augment private saving and can ensure the growth rate of 7 percent.

A note on two gaps in the second five year plan.

There is no projection of income from bear to year during SFYP, There are GDP for 79-80 given at Tk. 17976.93 crore and terminal 1984-85 GDP as TK 25450.73 crore. We may compute GDP in the intervening years From the phasing of development outlay for these years applying capital output ratio. Projected new GDP series is given by GDP

Since all development outlay is not investment in the calculation of above series, a prorata deduction of non-investment has been done and it is found that the new projected terminal year GDP is however lower by Tk. 473 crore.

This new series will be utilized now for calculating domestic resource and foreign exchange gaps by the following formula:-

$$K(Y_t - Y_0) - S_0 - s(Y_t - Y_0) = M_0 + m(Y_t - Y_0) - X_0(1+h)^t$$

- where
- K = Capital output ratio
  - $Y_t$  = GDP in the t \* year
  - $Y_0$  = GDP in the bench mark year
  - $S_0$  = Saving in the bench mark year
  - S = marginal propensity to save
  - $M_0$  = Imports in the bench mark year (Values)
  - m = marginal propensity to import.
  - $X_0$  = Export in the bench mark year (Values)
  - h = Annual rate of growth of exports
  - l = Planning time period.

Calculated values of two gaps are as follows: -

$$K(Y_t - Y_0) - S_s(Y_t - Y_0) = M_0 + m(Y_t - Y_0) - X_0(1+h)^t$$

$$\text{or } 2.86(24977.41 - 17976.93) - 612.12(Y_t - Y_0) = 3924 + 25(Y_t - Y_0) - 1234(1+0.069)^5$$

$$\text{or } 2.86(7000.48) - 612 - 5152.52 = 23979.53 - 7570.91$$

$$\text{or } 20021.37 - 5764.53 = 23979.53 - 7570.91$$

$$\text{or } 14,256.84 = 16408.62$$

It appears that the foreign exchange resource gap is larger than the domestic reserve gap. The rate of growth of import has been larger than the corresponding export growth and GDP.

Total saving calculated showed wide difference with the resources to be generated during SFYP. Total resource generated show an equivalent of Tk. 11715 crore where as calculated resources as done above shows Tk.5764.53 corer based on initial savings of Tk. 612 corer for 1979-80(given in the first chapter of the plan).

Though there is no reason for ex-ante equilibrium between domestic saving gap and foreign exchange gap; in the ex post sense these two must be equal. It appears that the gap shown in the SFYP. seems to have been worked out on the basis of absolute values. Marginal saving or Marginal propensity to Import have no where

been mentioned except for additional taxes suggested to be imposed on agricultural income. It may be that the tax rates have been calculated without Progressive rate for marginal income.

Additional taxation will be around 20% of the additional income generated which could be made higher. Unless progressive rates are allowed on marginal income will add to inflation provided private sector does not mobilize saving from marginal income at higher rate.

On the other hand, the growth of imports has been shown at a much higher rate than the rate of growth of export this shows foreign exchange gap to be larger than the projected inflow of foreign aid.

One remedy seems after reading Ramon A, sub that reimbursement of Taka cost by foreign currency by donor is one of the way, of meeting domestic savings gaps over foreign exchange gap.

Since the foreign exchange gap is larger than the domestic resource gap the following savings constraint model is applicable to calculate the net capital inflow.

The Structure of the model is as follows.

$$\begin{aligned}
 Y_t^* &= Y_0(1+r^*)^t \\
 I_t^* &= 6r^* Y_t \\
 S_t^* &= S_0 + S_1^* Y_t^* \\
 X_t &= X_0(1+C)^t \\
 M, \text{ or } M_t^* &= (6r^* - S_1^*) Y_t^* - S_0 \\
 F_t &= (6r^* - S_1^*) Y_t^* - S_0 \\
 C_t &= (1 - S_1^*) Y_t^* - S_0
 \end{aligned}$$

The Solution of  $F_t$  is given by the following formal derived the equations (Reduced)

$$F_t^S = \frac{(6r^* Y_0) r^{*2} + Y_0 (6 - S_1^* t^*) r^*}{(S_1^* Y_0 + S_0)}$$

(Meaning of Symbols)

- $Y_t^*$  = Planned gross national product at target year of the plan.
- $I_t^*$  = Planned investment at the target year of the plan.

$S^*t$  = Planned growing at the target year of the plan.

$Xt$  = B x Export at the target year of the plan

Mtr Mt = Planned import at the target year of the plan.

$Ft$  = Balance of payment on current account target year of the plan.

$Ct$  = consumption at the target year of the plan.

$\phi$  = capital output ratio of plan

$r$  = planned ratio & growth

## Rapid Urban Growth of Dhaka City & Its Socio-Economic Impact

SARDER SYED AHMED\*  
MD. REZAUL KARIM\*\*

**Abstract:** *Bangladesh is a most densely populated country consisting of 150 million of population. Its urban population has grown at a yearly average rate of 6% since independence. Urban population of Bangladesh has grown 7 folds from 1974 to 2011. During the last century world population had increased tremendously. The level of urbanization in Bangladesh was 4.33% in 1974 which has been increased at 28.40% in 2011. Total urban population was 6.7 million in 1974 which at present stands at 42.11 million. Dhaka, Chittagogn, Rajshahi & Khulna are the largest cities in Bangladesh. Most of the urban population of Bangladesh lives in 4 largest cities and 40% of the urban population live in Dhaka only. Once Dhaka was a green beautiful city. It was an attractive place to tourist for its natural beauties and historical heritage up to 1980. Now Dhaka becomes an unlivable dirty city.*

*Transport and Communication system of Dhaka are in a very miserable condition. Inadequacy of Roods, **insufficiency of mass transport and excessive private cars are the causes of traffic congestion.***

*Dhaka is the least motorized mega city in Asia. But Dhaka's economy is crippled by highest cost of congestion. Dhaka has the highest congestion index and one of the highest commuting times in South Asia. Average commuting time is 50 minutes and can reach two hours at reach time (World Bank-2012). Long travel time incurs huge cost to both individual and the economy and congestion also degrades air quality of Dhaka.*

\* Professor (Rtd). & Ex-President, Bangladesh Economics Teachers Association.

\*\* Professor & Head of the Department of Economics, Govt. Rajendra College, Faridpur & General Secretary, Bangladesh Economics Teachers Association.

*Housing problem is one of the main problems in Dhaka city. About 40 percent of urban population of Bangladesh lives in Dhaka. It is estimated that Dhaka needs 65,000 new houses every year & it needs more 4 sp. km. land yearly. According to CUS survey, 33 percent of city land is residential and according to the survey of JICA, area of residential is only 19 percent. In both of the survey it has been shown that 40 percent land is still used in non-urban purposes.*

*Number of slum household is 1043329 in the urban areas of Bangladesh of which 673883, that is, 64% live in Dhaka. People of the slums lead a miserable in human life- life of animals. In the slums 1500-2000 people live per sq. acre where as in Gulshan it is only 30 people. Besides slums there are 2-3 lac floating people. They sleep under the open sky, Railway stations, Launch ghat and Bus stand and also on the foot-path. Due to fast urbanization Dhaka faces the problem of utility services. The poor international ranking suggest that citizens access to basic services is relatively poor in Dhaka in comparison to other mage cities of the world.*

*Ratio of housing prices to income is higher in Abidjan, Gakarta and Dhaka. It is highest in Bangladesh 16.7. The high housing price to income ratio suggests the low affordability of housing, which is a basic urbanization challenge. The mismatch in the supply and demand for different types of housing in Dhaka is a critical constraint of housing in Dhaka. 20 to 30 Organizations and Department are engaged in performing different functions. There is no proper co-ordination among the organizations and departments. Proper location planning for industries, educational institutions especially Universities & Hospitals is essential to avoid undesirable congestions and sound pollution. To sustain economic development of Bangladesh we should develop other cities and towns to reduces Dhaka's primacy.*

## **Introduction**

Bangladesh is a most densely populated country consisting of 150 million of population. Its urban population has grown at a yearly average rate of 6% since independence. Urban population of Bangladesh has grown 7 folds from 1974 to 2011. During the last century world population had increased tremendously. World urban population was only 15% in 1900 which had increased at 52% in 2011. The level of urbanization in Bangladesh was 4.33% in 1974 which has been increased at 28.40% in 2011. Total urban population was 6.7 million in 1974 which at present stands at 42.11 million. Dhaka, Chittagogn, Rajshahi & Khulna are the largest cities in Bangladesh. Most of the urban population of Bangladesh



lives in 4 largest cities and 40% of the urban population live in Dhaka only. Once Dhaka was a green beautiful city. It was an attractive place to tourist for its natural beauties and historical heritage up to 1980. Now Dhaka becomes an unlivable dirty city. Growth rate of Dhaka’s population is very much high.

Dhaka now becomes a mega city. Dhaka mega city includes Dhaka City Corporation, Narayangonj City Corporation, Kadam Rashul, Savar, Tongi, Pourashavas, Gazipur City Corporation & adjacent thanas. The higher rate of growth of Dhaka’s population creates various problems and makes Dhaka an unlivable megacity. Problem of environment, health, transportation and communication make the city unlivable. The city has recently been rated as second least livable city with ranking 139 out of 140 cities.

**Population of Dhaka Mega City**

Dhaka is an oldest city. It is known to have existed in the 7<sup>th</sup> century. During the Mughal period Dhaka became a prestigious city of the empire of Mughal. It was named as Jahangir Nogar after the name of the Emperor Jahangir. It was made the

Table 1: Population of Dhaka in the National and National Urban Context 1974-2011

Year	Population of Dhaka (million)	Percent of National Population	Percent of National Urban Population
1974	1.77	3.0	28.3
1981	3.44	3.8	25.7
1991	6.84	5.8	30.5
2001	10.71	8.0	37.4
2011	13.00	8.9	40.00

Source: Calculated from BBS, 1994, and World Bank-2012

Population of Dhaka (percent of national population)  
Percent of National Urban Population

Figure-1

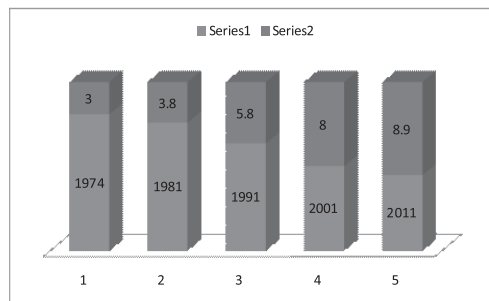
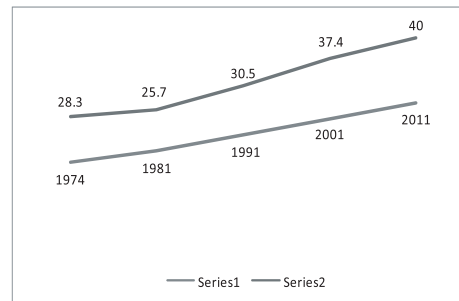


Figure- 2



capital of Bengal in 1608 by Subadr Islam Khan. After the partitation of India and Pakistan, Dhaka was made the Capital of East Pakistan. After independence in 1971, Dhaka was made the capital of Bangladesh. The population of Dhaka increased tremendously during 1971 to 1991. In 1974, 1<sup>st</sup> Population Census of Bangladesh was under taken. According to the census of 1974 population of Dhaka city was 1.77 million which increased at 6.84 million in 1991. (Table 1 and Figure-1.2)

From 1991 to 2011 Dhaka's population increased at a higher rate & stood at 13 million and in 2014 perhaps it may be increased at 18 million. Only 28.3% of national urban population lived in Dhaka in 1974 which has been increased at 40% in 2011. Dhaka now becomes a mega city where 9% of the total population of Bangladesh lives. (Table 1 Figure 1-2). The area of Dhaka city was 326 sk km in 1974 which expended at 1530 sk. km in 2001 and at present it may be near about 2000 sk km. The contribution of Dhaka mega city to GDP of Bangladesh was 36% in 2009 (WB-2012) and at present it may be above 40%. Rapid growth of Dhaka mega city contributes significantly to the GDP growth and development of Bangladesh but excessive urban concentration in the absence of concomitant improvement urban management and infrastructure carries associated economic cost in the from of congestion and pollution. Such cost is indent in Dhaka. There arise problems of housing, health and environment, sanitation and utility services for rapid population growth in Dhaka.

### **Some Problems of Dhaka mega city**

#### **1) Transport and communication**

Transport and Communication system of Dhaka are in a very miserable condition. Inadequacy of Roods, insufficiency of mass transport and excessive private cars are the causes of traffic congestion. Dhaka is the least motorized mega city in Asia. But Dhaka's economy is crippled by highest cost of congestion, in Dhaka compared to other Asian countries, around 90% of the daily travel trips are bus, walk and rickshaw trips and closed to 60% of the trips are Zero emission trips. Dhaka has the highest congestion index and one of the highest commuting times in South Asia. Average commuting time is 50 minutes and can reach two hours at reach time (World Bank-2012). Long travel time incurs huge cost to both individual and the economy and congestion also degrades air quality of Dhaka.

In the main cities areas roads are narrow and mass transportation are inadequate in comparison to population density. In the central city density of population is much higher than other areas. Population density of central city is 26000 &

*Table 2: Number of Garments Industries and Employees along Different Primary Roads*

Name of Primary Roads	No. of Garments Industries	Percentage	No. of Employees	Percentage
Airport Road	432	31.3	195,485	33.91
Rokeya Sharani	354	25.65	144,973	25.15
Progoti Sharani	353	25.58	144,029	24.99
Mirpur Road	241	17.46	91,967	15.95
Total	1,380	100.00	576,454	100.00

Source: Hoque Shamsul & et al- Road safety garment Industry workers in Dhaka City.

average density of mega city is 13000 per sk km. (WB-2012). Garments workers aggravated the situation further due to spread of garment industries in 1980s and 1990s. Large number of garment industries is clustered on the primary roads

*Table 3: Numbers of Garments Industries and Employees along Different Secondary Roads*

Name of Primary Roads	No. of Garments Industries	Percentage	No. of Employees	Percentage
Motijheel C/A	146	32.30	68,284	35.63
Elephant Road	75	16.59	34,498	18.00
Purana Paltan	43	9.51	15,718	8.20
Dilkusha C/A	42	9.29	17,832	9.30
Kamal ataturk Avenue	36	7.96	20,169	10.52
Motijheel Circular Road	26	7.96	10,348	5.40
Kachukhet	24	5.75	9,534	4.97
Kafrul, Ibrahimpur	13	5.31	7,175	3.74
Naya Paltan	11	2.88	3,419	1.78
Mirpur # 14		2.43	4,689	2.45
Total	452	100.00	191,666	100.00

Source: Hoque Shamsul & et al- Road safety garment Industry workers in Dhaka City.

(Table-2).

Even in commerical area large number of garments are established. Hoque Md Shamsul and et al found in a study that a total of 2960 enlisted garment industries

are in the heart of Dhaka city where 10,70,754 workers are employed. Factories are found to be clustered along the primary and secondary roads and 72% of the workers are working in these industries. Nearly 47% of the industries are localized in Airport Road, Rokeya Sharni, Progoty sharni, Mirpur Road. (Table 2-3) The study also states that everyday workers of these industries generate 5,82,000 workers movements. The industries of Motijheel and Dilkusha Commercial area generate nearly 68,000 workers movements in the busy central business areas. Garment industries in city areas are the main cause of congestion. According to the Dhaka Chamber of Commerce & Industries loss due to congestion in Dhaka is equal to 3% of this GDP of Bangladesh. Some govt. universities and about 50 private universities are situated in Dhaka city corporation area. There are hundreds and thousands of schools, colleges & Madrashes in city corporation areas which are also responsible for congestion. Large number of employees in govt. and private organizations contribute to congestion.

## **2) Housing**

Housing problem is one of the main problems in Dhaka city. About 40 percent of urban population of Bangladesh lives in Dhaka. Rahman (1996) estimated that Dhaka needs 65,000 new houses every year & it needs more 4 sp. km. land yearly. According to CUS survey, 33 percent of city land is residential and according to the survey of JICA, area of residential is only 19 percent. In both of the survey it has been shown that 40 percent land is still used in non-urban purposes (Nazrul-1996). Excessive land price is at root of Dhaka's housing problem. Dhaka's land prices are higher comparable to those in sub-urban New York or London. (WB-2009)

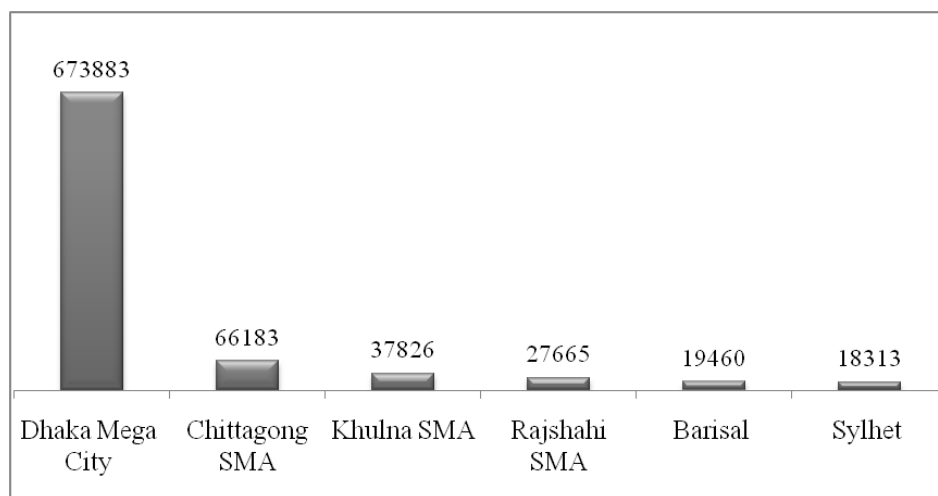
Dhaka is located in flood plain and surrounded by rivers. These create scarcity of developable land. So population density stands at 24000 to 26000 per sq. km. and in some parts even 1,00,000. Since 1959 RAJUK has developed sufficient only for 16000 housing units or less than 400 unit per year. At the same time the area within its jurisdiction has added more than 6 million people roughly (One Million hose hold). (World Bank 2009). Number of higher- & middle-class families in Dhaka is 30 percent and this 30 percent enjoy 80 percent ownership of residential area. Rest 70 percent is the owner of 20 percent residential area and 50 percent house hold have no land of their own. Due to lack of housing facilities and excessive house rent the poor are supposed to live in slums. According to United Nations population fund 47 percent people live in slums. According to the survey of ADB and Ministry Planning in 1996, 32% of Dhaka's household live in jhupris.

According to the report of World Bank 2012, 40 percent population of Dhaka live in slums. There are 9048 slums in the urban areas of Bangladesh of which 53 percent (4966) located in Dhaka. (Table 4 & Figure- 3).

Table 4: Number of slum and cluster between 1997 and 2005 census.

S.N	Name of city	1997 no slums	% of total	2005 no slums	& of total	Household 2005	% of household
01.	Dhaka Mega City	1579	52.79	4966	54.9	673883	64.16
02.	Chittagong SMA	186	6.22	1814	20	66183	25.5
03.	Khulna SMA	202	6.75	520	5.7	37826	3.6
04.	Rajshahi SMA	84	2.81	641	7.1	27665	2.6
05.	Barisal	*	-	351	3.9	19460	1.9
06.	Sylhet	**	-	756	8.3	18313	1.7
07.	14 cities	293	9.8	***	***	-	-
08.	100- Paurashavas	647	21.63	***	***	-	-
	Total	2991	100	9048	100	10,43,329*	100.00

\* Number of Population of slums in Dhaka 3286770 & Bangladesh 5233217  
 Source: Slum of Bangladesh an Overview/economics bd, Posted on March 6, 2011  
 \* Included with Khulna \*\* Included with Chittagong \*\*\* Not coverage



Number of slum household is 1043329 in the urban areas of Bangladesh of which 673883, that is, 64% live in Dhaka. (Table-4 & Figure-3). People of the slums lead a miserable in human life- life of animals. In the slums 1500-2000 people live per sq. acre where as in Gulshan it is only 30 people. (Ahemd 1996). Besides slums there are 2-3 lac floating people. They sleep under the open sky, Railway stations, Launch ghat

and Bus stand and also on the foot-path. According to research report of ADB and planning commission (1996) 89 percent residents of Dhaka live in 1 room & 65 percent live below 100 sq. feet and 96 percent households live in space of less than 200 sq. feet. Houses are built haphazardly without proper planning. Rujuk has no attention in long run planning strategy. In some old residential area, high-rise buildings are permitted where as 20 years before it had permitted only for 5 storied building. These are indication of lack of long rung planning strategy. The high-rise building in the old residential have area created heavy pressure in utility services like water, electricity, sewerage and drainage system. This sort of change in planning strategy of Rujuk clearly a violation of the constitution of the Peoples Republic of Bangladesh. High rise buildings deprive the residents of the 5 storied buildings from God gifted free air, sunlight & moonlight, upon which every citizen has equals right. Derivation of any one from free goods is illegal and inhuman.

**3) Utility services** Due to fast urbanization Dhaka faces the problem of utility services. The poor international ranking suggests that citizens access to basic services is relatively poor in Dhaka in comparison to other mage cities of the world. This is shown is table No-5.

*Table 5: Access to Basic Services in Dhaka Compared with Selected Cities (1998)*

City	Ratio of housing prices to income	Access to potable water (%)	Access to sewerage connection (%)	Access to electricity (%)	Access to telephone (%)
Dhaka	16.7	60	22	90	7
Buenos Aires	5.1	100	98	100	70
Santiago de Chile	n.a.	100	99	99	73
Abidjan	14.5	26	15	41	5
Yangon	8.3	78	81	85	17
Rio de Janeiro	n.a.	88	80	100	59
Jakarta	14.6	50	65	99	25
Ibadan	n.a.	26	12	41	n.a.
Seoul	5.7	100	99	100	80
Lima	10.4	75	71	99	n.a.
Banetok	8.8	99	100	100	60
Casablanca	n.a.	83	93	95	n.a.
Damascus	10.3	98	71	95	10
Ankara	4.5	97	98	100	80
Cebu	13.3	41	92	80	25
Lima	10.4	75	71	99	n.a.

Source: World Bank 2005a.

Ratio of housing prices to income is higher in Abidjan, Gakarta and Dhaka. It is highest in Bangladesh 16.7 (Table -5). The high housing price to income ratio suggests the low affordability of housing, which is a basic urbanization challenge. The mismatch in the supply and demand for different types of housing in Dhaka is a critical constraint of housing in Dhaka.

It can be seen from table-5 that Dhaka's position is good in access to electricity (90%) but lacks behind in other services. Only 60% of the dwellers in Dhaka city have access to portable water and 22% have access to sewerage connection. (Table-5). The study conducted by CUS in 2005 shows that 72% of urban population use traditional fuel for cooking and only 22% have access to Gas facilities. Slum dwellers in the city are in a most disadvantaged position in terms of their access to urban utility services & garbage disposal. About 67% of slum dwellers use electricity and 30% still have no access to electricity (Hossain-2008). In another report it is shown that 44% of household have sanitary latrines and small portion of the urban poor (20%) use sanitary latrine (Shahadat-2008) and about 30% of the population have no access to any type of sanitation (Zamal-2010). It is estimated that about 3200 metric tons of solid waste are produced per day. Among them only 50% is collected by the city corporation authority for proper disposal.

#### **4. Environmental degradation**

Every man has right to live in a beautiful natural environment. It is a great challenge of urbanization to sustain development without hampering environment. Fast growth of Dhaka city gives birth various social and environmental problems. Huge number of motorized vehicles create air pollution and sound pollution. Black smokes of vehicles & industries contribute to air pollution and it is much above the normal level. Industrial wastes & human waste and chemicals waste pollute soil, water & air of the city.

Sewerage system of Dhaka is very much inadequate. Only 22% household have sewerage connection and 20 percent area of the city are under sewerage system. Large number of kacha toilet still exist (40%) and 40% of the poor use open latrines. Once Dhaka city was known a beautiful and healthy city. But at present it is turned into a dusty and unhealthy beautiful unlivable city. About 40% of the total population of the city lives in slums, over and above, there are 3 lac floating people who use dustbin and open spaces as latrine. Wastes of dustbins are not fully cleared; 42-50% remain scattered in the bins which make the environment polluted. Only a small fraction of the poor household of the slums, use dustbin. In

the recent times use of plastic goods have been increased tremendously. Polythin bages and plastic goods fill up drains and pits causing water logging. The drainage system of Dhaka is in a miserable condition. Rainfall water can not fall smoothly due to unplanned drainage system & closure of the open drains beside roads and natural drains. As a results rain water makes water logging for long time. Surface water entering into sewerage pits all the city is flooded over by dirty water. Industry are one of the main causes of environmental problem. Before 1970 there were a few industries in the heart of the city. In 1994 there were 1042 polluting industries, now the number have been increased. Among the polluted industries tannery 137, steel 48, metal 46, textile 181, Chemical 67, Ruber 28, Tobacco 7, hides 32, plastic 11, dying 145, Medicine 33, welding 187, shaw Mills 57 and Board Mill-2 (Table-6). Since 1980s garments industries were establishing here and there in the city and number of garment industries stand at about 3000 with about 11 lac wokers. Most of the industries are localized in the densely populated areas. It is seen from the table-6 that industries are clustered in Lalbag, Mirpur, Sutrapur, Malibagh, Motijheel & Mohammadpur. (Table-6)

Table 6: Thana wise polluting industries in Dhaka City

Thana	Industry number	Polluting industry	percent	Served industries
Malibag	322	85	25.9	29.49
Sutrapur	160	41	25.3	13.53
Quotawali	85	21	25.2	7.80
Bongshal	14	4	28.6	1.41
Dhanmondi	29	3	10.0	1.06
Mohammadpur	48	42	25.0	8.86
Mirpur	272	82	29.7	28.78
Motijheel	63	21	30.8	7.37
Gulshan	6	1	16.6	0.35
Uttara	3	1	33.3	0.35
Demra	40	11	26.4	7.71
Total	1042	282	-	100.00

Source: Bangladesh Urban studies vol-2 No.2 June 1994

It was not justified to allow establishing industries in the heart of city. It is an urgent matter to prohibit any industry in the main city. Shifting of present industries to outside city is a great necessity to make the city livable. Urbanization plays a great role in the economic development of the country but unplanned excessive is not helpful after a certain point. Cost of economic development is much higher and at the cost of sufferings of the citizens. The sufferings are for inadequate utility services, transport, communication and also for environmental hazards.



### **Ethical Values and City life**

In the urbanization process ethical aspect is totally ignored in Bangladesh. Unplanned Urbanization creates problems like housing, traffic jam, scarcity of utility services. Due to housing problems near about 40% of the citizen of Dhaka city lives in slums and the slum dwellers are deprived of basic human needs. They not only live in unhygienic houses & even they also have no access to utility services. All the organizations engaged in providing utility services & organizations engaged in planning & implementation did not play their due role sustaining Dhaka a live able city. Dhaka WASA is not able to supply sufficient water for citizens. Water supplied by the authority is not safe for health. As a result, a large number of people full fills water demand from market which incurs extra cost and sufferings. Lack of proper plan- policy and management, traffic jam becomes a serious problem in Dhaka. Traffic Jam incurs great loss of labour time of the citizens which has a great negative impact on the economy of the country. Planning & Management Policies for city development are not based on ethical values. Degradation of moral values of the citizen as the hold makes the city unlivable.

### **Conclusion**

About 10 percent of the total population of Bangladesh lives in Dhaka mega city. But Management of the city is very much dissatisfactory & it is hard to manage such a large mega city. 20 to 30 Organizations and Department are engaged in performing different function. There is no proper co-ordination among the organizations and departments. Steps may be taken to form some from of city government with greater power and authority for the mayors and other elected representative. Proper location planning for industries, educational institutions especially Universities & Hospitals is essential to avoid undesirable congestions and sound pollution in order to maintain peaceful residential environment. To sustain economic development of Bangladesh we should develop other cities and towns to reduces Dhaka's primacy. Proper planning Management and steps should also be taken to make Dhaka a livable city. For City Competitiveness planning and management actions to be taken to make Dhaka capable of innovative, connective and livable. Road networks are very much important for market access which acts as a vital factor for attracting investment. To make a livable city sewerage and drainage system should be improved and wastes management should be efficient, so as to use wastes as resource for generating economic development of the country. Necessary actions may be taken to use wastes in recycling & fertilizer production. Flyover is not proper solution of congestion rather decentralization of administration & shifting of universities and garments form Dhaka central area to peri urban areas is an urgent need of the time.

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## Socioeconomic Status of Entrepreneur and Non-entrepreneur Tribal Women in Sylhet Region of Bangladesh

ROMAZA KHANUM\*  
MUHAMMAD SALIM AL MAHADI\*\*  
M. SERAJUL ISLAM\*\*\*

**Abstract:** *Considering the broad thematic areas of entrepreneurship development, this research has drawn upon livelihoods improvement in Sylhet region of Bangladesh. The main objective of the study was to compare the differences between entrepreneurs and non-entrepreneurs tribal women considering their socioeconomic characteristics. It employed primary data collected from 360 tribal women, of them 180 for entrepreneurs and these of 180 for non-entrepreneurs in two districts namely Sylhet sadar and Moulvibazar. For examining women's status, the present research studied four enterprises (i.e. pig farming, shop keeping, handloom weaving, and bamboo handicrafts etc.) for four tribal communities such as Garo, Khasia, Monipuri, and Patro respectively. Multi-stage random sampling technique was used within a methodological context of participatory action research at individual, household and community level. A set of data collection technique, which include baseline survey, face to face interviews, individual discussion with headman or local NGOs and addah (informal chatting) was used during the research to attain the objectives of the study. Independent t-test, and Constraint Index (CI) were used to determine present situation of tribal women. The research findings revealed that entrepreneur women were in better condition in terms of age, education, family size, annual personal*

\* Professor, Dept. of Agricultural Economics and Policy, Sylhet Agricultural University, Sylhet.

\*\* Deputy Director, Dept. of Planning, Development & Works, Sylhet Agricultural University, Sylhet.

\*\*\* Professor, Dept. of Agricultural Economics, Bangladesh Agricultural University, Bangladesh.

*income, and housing and sanitation etc., than non-entrepreneurs. Considering tribal community, all (100%) educated women entrepreneurs were in Patro and Garo communities followed by Monipuri (98%) and Khasia (89%) respectively. In case of personal income, it revealed that Tk 30141, Tk 29852, and Tk 119413 were earned and received by Garo, Khasia, and Patro but Monipuri shared highest income (Tk 140526) among them. It was found that non-entrepreneurs' household spent more in food items (about 65%) than entrepreneurs, whereas entrepreneurs spent more in non-food items. It is recommended that enterprise should be local, cultural, and social based with more financial and technical support from GO and NGOs.*

**Key words:** *Entrepreneurship development, livelihood improvement, tribal women, enterprises, socioeconomic characteristics*

## **Introduction**

Development of tribal economy is essential pre-conditions to the development of a nation as a whole. The gap between tribal-mainstream people needs to be lessened through increase in the standard of living of the tribal people. A large proportion of the people of Bangladesh are living in her forest, hills, coastal areas and other places, about 1.41 million are tribal which constitute 1.13% of the total population (BBS, 2010). In Bangladesh, different ethnic-linguistic groups have been living for many centuries. They are scattered mainly in hilly parts of Rangpur, Dinajpur, Rajshahi, Mymensingh, Sylhet and Chittagong Hill Tracts (CHTs). Their life is extremely fascinating. Majority of them are Buddhists and the rest are Hindus, Christians, and Animists, the bondage of religion, and elements of primitiveness are strongly displayed in their rites, rituals and everyday life.

In the tribal society, women play a very important part in the highly labour intensive production process and contribute to their family income. Traditionally, they are playing an important role in their society for creating access to human, natural, financial and social capital by establishing the small and home based enterprises as cloth and handloom weaving, betel leaf and *Jhum* cultivation etc. Recently, these traditional enterprises are given a new look or in a more innovative way and also add new enterprises such as poultry rearing, pig farming, shop keeping, beauty parlour, etc. However, the majority of new livelihood opportunities are considered not only in farming activities, but also in various non-farm or small-scale businesses. Their growing economic power significantly improve their participation in intra-household decision making process; family planning, children education, health and nutrition etc. (Steele *et al.*, 2001; Parvin

*et al.*, 2005; Chowdhury, 2007) to meet the basic needs of the family, property rights and sustain a given standard of living. For this reason, tribal women are changing their livelihood activities from traditional views, which make their income more cost-effective than past. Some of the literature indicates that women's income is the sources of power and opportunities that may otherwise hinder their lives (e.g. Al-Amin, 2008; Rahman and Naoroze, 2007; Haque and Itohara, 2008; Fakir, 2008). The study is conducted on Sylhet region of Bangladesh. Moreover, a number of studies (Sarma, 2014; Janardhan and Krishna, 2016; Sarma and Varma, 2008; Kabir *et al*, 2006; Soni, 2015; Roy and Manna, 2014; Raja and Radhaakrishnan, 2016) have been conducted in home and abroad, some of them are entrepreneurship development related, some of them are on socioeconomic conditions of tribal people but no systematic and comprehensive study has so far been conducted on tribal women in Bangladesh, particularly in Sylhet region. The study aimed at and attempted to compare the differences between entrepreneur and non-entrepreneur tribal women considering their socioeconomic characteristics.

### **Methods and Materials**

A multistage random sampling technique is used to ensure that the survey is representative of targeted tribal women. For the study, two districts are purposively selected from Sylhet division namely Sylhet and Moulvibazar because here tribal women's involvement with entrepreneurial activities is quite new. Two upazilas from each district namely Gowainghat and Sylhet sadar are selected from Sylhet, Sreemangal and Kulura are also being selected from Moulvibazar district. A total of 31 villages/*paras/punji* are randomly selected, where four tribal communities (i.e. *Monipuri*, *Khasia*, *Garo* and *Patro*) were considered purposively in which three are dominant namely *Monipuri*, *Khasia*, and *Garo* and another is a minor group namely *Patro*. Two tribal women groups were also selected for the purpose of this research; a) tribal women entrepreneur who involved in entrepreneurial activities and b) non-entrepreneur tribal women who were not involvement in entrepreneurial activities. Moreover, four enterprises were considered such as pig farming, bamboo handicraft, handloom weaving and shop keeping respectively.

In Sylhet district, 175 tribal women were selected randomly in which 77 women are entrepreneur and these of 98 are non-entrepreneurs respectively In terms of Moulvibazar district, 185 of tribal women were selected in which 82 of tribal women were non-entrepreneur respective. Consequently, the sample size stood at 360. For the selection of sample size from upazila, tribal women and enterprises,

the easy statistical tool of percentage as 30% was applied. So, after the selection of percentage (30%) from each tribe as well as each group, 180 entrepreneurs and that of 180 non-entrepreneur tribal women were selected randomly. Both quantitative and qualitative approaches are available for data collection and each approach is based on particular situation and purpose. To address the objective, some variables such as age, educational level, marital status, family size, dependency ratio, household head, personal income, household expenditure, association with NGOs, and occupational status of family member etc. are considered. In that case, descriptive techniques have been used to determine the present situation. In this study, independent sample t-test is used to determine the differences between two groups of entrepreneur and non-entrepreneur tribal women. Finally, a Constraint Index (CI) is calculated for ranking the constraints as follows;

$$\text{Constraint Index (CI)} = C_3 * 3 + C_2 * 2 + C_1 * 1 + C_0 * 0$$

Where,

$C_3$  = Frequency of tribal women faced 'severe' constraints

$C_2$  = Frequency of tribal women faced 'significant' constraints

$C_1$  = Frequency of tribal women faced 'insignificant' constraints

$C_0$  = Frequency of tribal women faced 'not at all' constraints

Four-point rating scale was used, where 3 assigned for 'severe', 2 for 'significant', 1 for insignificant and 0 for 'not at all'.

### Results and Discussion

The age of the selected entrepreneur tribal women varied from 30 to 45 years with a mean and standard deviation of 36 and 5.6 years respectively. The results indicate that the average age (30.8%) of the tribal women entrepreneurs belong to the age brackets of 31-35 years. The greater proportion that is 37.5 and 36.2% of entrepreneurs were in *Garo* and *Khasia* communities respectively. In terms of non-entrepreneur tribal women, the highest age range (29.3%) were within 31-35 years while the greater proportion (35%) was covered by *Khasia* community and then *Patro* community 32.1% within that the age structure respectively.

The result indicated that entrepreneur tribal women are younger than non-entrepreneurs for which they are capable of adapting the small enterprises that influence to others attitude, skill and aspiration. It may be a reason to involved tribal women in labour intensive economic activities. The result of t-test shows that entrepreneur are significantly ahead compared to non-entrepreneur.

Table 1: Age structure of entrepreneurs and non-entrepreneurs of tribal women

Age group (year)	Entrepreneur tribal women				Non-entrepreneur tribal women				t-test	
	Garo	Khasia	Monipuri	Patro	All entre	Garo	Khasia	Monipuri		Patro
25 to 30	7 (12.5)	9 (19.1)	11 (20.4)	2 (8.7)	29 (16.1)	3 (7.1)	5 (12.5)	3 (6.7)	8 (15.1)	19 (10.6)
31 to 35	21 (37.5)	17 (36.2)	15 (27.8)	5 (21.7)	58 (32.2)	8 (19.0)	14 (35.0)	14 (31.1)	17 (32.1)	53 (29.4)
36 to 40	18 (32.1)	13 (27.7)	13 (24.1)	8 (34.8)	52 (28.9)	11 (26.2)	12 (30.0)	9 (20.0)	9 (17.0)	41 (22.8)
41 to 45	9 (16.1)	5 (10.6)	12 (22.2)	6 (26.1)	32 (17.8)	12 (28.6)	9 (22.5)	11 (24.4)	10 (18.9)	42 (23.3)
46 to 50	1 (1.8)	3 (6.4)	3 (5.6)	1 (4.3)	8 (4.4)	6 (14.3)	0	5 (11.1)	6 (11.3)	17 (9.4)
51 to 55	0	0	0	1 (4.3)	1 (0.6)	2 (4.8)	0	3 (6.7)	3 (5.7)	8 (4.5)
All age groups	56	47	54	23	180	42	40	45	53	180
Mean			36					38		
Std. deviation			5.6					6.4		

Source: Field survey, 2015

Note: entre = entrepreneurs and non-entre = non-entrepreneurs

Figures in the parenthesis indicate % of age structure of the respondents of respective age group

Table 2: Educational status of tribal women in the study

Educational level	Entrepreneur tribal women					Non-entrepreneur tribal women					t-test
	Garro	Khasia	Monipuri	Patro	All entre	Garro	Khasia	Monipuri	Patro	All Non-entre	
Illiterate	0	5	1	0	6	9	10	8	14	41	
		(11)	(2)	(2)	(3)	(21)	(25)	(18)	(26)	(23)	
Primary	20	19	19	7	65	17	17	17	29	80	
(1-5)	(36)	(40)	(35)	(30)	(36)	(41)	(43)	(38)	(55)	(44)	
Secondary	36	23	34	15	108	16	13	20	10	59	
(6-10)	(64)	(49)	(63)	(65)	(60)	(38)	(33)	(44)	(19)	(33)	13.9***
Higher Secondary	0	0	0	1	1	0	0	0	0	0	
(11-12)				(4)	(1)						
Total literate	56	42	53	23	174	33	30	37	39	139	
Literacy rate (%)	32.2	24.1	30.5	13.2	100	23.7	21.6	26.6	28.1	100	
All educational level	56	47	54	23	180	42	40	45	53	180	
Mean				4.27							1.10
Std. deviation				2.971							0.741

Source: Field survey, 2015



It can be seen from Table 2 that the adult literacy rate (97%) of entrepreneurs is higher than the national (52.96%) level literacy rate (BBS, 2013). Table 2 revealed that 77% of non-entrepreneurs tribal women are literate while 44% have primary level of education and those of 23% illiterate. Considering the average literacy rate, more educated non-entrepreneurs tribal women are found in *Patro* (about 28%) community followed by *Monipuri* (about 27%) and *Garo* (about 24%) respectively.

Though 3 and 23% of entrepreneurs and non-entrepreneurs have no formal education, they still performed different income activities without resource to their educational background. It is found that mean and standard deviation of educational level is 4.27 and 2.97 for entrepreneurs and 1.10 and 0.74 for non-entrepreneurs respectively. In the tribal society, it is also observed that nowadays parents are more willing to send their children to school for education. To compare between entrepreneurs and non-entrepreneurs tribal women among four tribes, it is found that the educational levels of non-entrepreneurs are lower than entrepreneurs.

The result indicates that majority of entrepreneurs (about 87%) are married, while in *Garo* community, married entrepreneurs interviewed are about 95% followed by *Monipuri* (89%) and *Khasia* (83%) respectively. In case of non-entrepreneurs, about 82% are married while majority of non-entrepreneurs (86.7%) are *Manipuri* community followed by *Garo* (83%) and *Patro* (81%) respectively.

The analysis between entrepreneurs and non-entrepreneurs indicated that entrepreneurs of tribal women are good enough in terms of married person than non-entrepreneurs. In that cases, it is clearly reported that widow and single women in entrepreneurial activities have better position than non-entrepreneurs in terms of occupational status and other factors in the respective study areas.

Table 4 shows that about 73% of entrepreneurs' household has a medium family size of between 4 to 6 persons while 7 and above member as large is 16% respectively. It is therefore, estimated that the average family size for entrepreneur is 4.9, which is lower than the national average of Bangladesh (5.5) (HIES 2013). Relatively higher family member of non-entrepreneurs (67%) are medium family, 14% of total is a small family and the remaining 18% is a large family respectively. The average family size per household is determined at 5.1 with a standard deviation of 1.32. This indicates that the average family size is slightly lower than the national level (5.5) of Bangladesh but higher than entrepreneurs' households in the study.

Table 4: Family size of entrepreneurs' and non-entrepreneurs' households

Family Size	Entrepreneurs' household				Non-entrepreneurs' household				All non-entre	t-test	
	Garó	Khasia	Monipuri	Patro	All entre	Garó	Khasia	Monipuri			Patro
Small (1 to 3 members)	10 (18)	5 (11)	2 (4)	2 (9)	19 (11)	9 (21)	6 (15)	4 (9)	7 (13)	26 (14)	
Medium (4 to 6 members)	35 (63)	30 (64)	49 (91)	18 (78)	132 (73)	27 (64)	32 (80)	30 (67)	32 (60)	121 (67)	
Large (Above 7)	11 (20)	12 (26)	3 (6)	3 (13)	29 (16)	6 (14)	2 (5)	11 (24)	14 (26)	33 (18)	1.45****
All categorized family size	56	47	54	23	180	42	40	45	53	180	
Average family size	4.7 (1.22)	5.1 (1.19)	5.0 (0.96)	4.9 (1.21)	4.9 (1.14)	4.5 (1.15)	4.7 (1.11)	5.6 (1.42)	5.4 (1.28)	5.1 (1.32)	

Source: Field survey, 2015

Table 5: Dependency ratio of entrepreneur and non-entrepreneurs' households

Tribal group	Family Size (person/hh)	Age groups			All age groups	Dependency ratio*
		<15 years	15-65 years	>65 years		
Tribal women entrepreneur households						
<i>Garó</i>	4.7	36.74	56.06	7.20	100	0.78
<i>Khasia</i>	5.1	35.56	58.16	6.28	100	0.72
<i>Monipuri</i>	5.0	24.80	64.68	10.52	100	0.55
<i>Patro</i>	4.9	25.89	66.07	8.04	100	0.51
All	4.9	30.75	61.24	8.01	100	0.64
Tribal women non-entrepreneur households						
<i>Garó</i>	4.5	28.95	62.63	8.42	100	0.60
<i>Khasia</i>	4.7	35.64	54.26	10.11	100	0.84
<i>Monipuri</i>	5.6	28.17	65.08	6.75	100	0.54
<i>Patro</i>	5.4	34.38	61.81	3.82	100	0.62
All tribal communities	5.1	31.78	60.95	7.27	100	0.65

Source: field survey, 2015

\*Dependency ratio = (population aged below 15 years + over 65 years)/population aged 15 – 65 years

The age distribution of working family members is presented in Table 5. On the other hand, non-entrepreneurs' dependency ratio is 0.65, varying from 0.54 to 0.84. In the study, *Garó* entrepreneurs (0.78) and *Khasia* non-entrepreneurs (0.84) have a very high dependency ratio due to lack of working people. Limited scope of income source also contributed to increase the dependency ratio in the study areas. It is therefore, indicated that the overall dependency ratio of non-entrepreneurs is slightly higher than entrepreneurs' household.

In terms of pattern of the tribal family, *Garó* and *Khasia* are matrilineal-based traditional society as 0.4 and 68% of *Garó* and *Khasia* of entrepreneur women reported that they are head of the family because of female-based and highly manifested stereotyped relationship (Table 6).

The overall data of entrepreneurs indicated from Table 6 that 45% women are head of the family, 33% of household are managed by husband and 7% are by father/father in law/son headed family respectively. To estimate the non-entrepreneurs' household, it is reported that 93 and 83% of *Garó* and *Khasia* women are head of their family respectively (Table 6). It is therefore, observed from the perspective of power and authority that the *Garó* and *Khasia* are still

Table 6: Head of entrepreneurs' and non-entrepreneurs' households

Head of the family	Entrepreneurs' household				Non-entrepreneurs' household				t-test	
	Garó	Khasia	Monipuri	Patro	All	Garó	Khasia	Monipuri		Patro
Self	45 (80)	32 (68)	-	4 (17)	81 (45)	39 (93)	33 (83)	-	6 (11)	78 (43)
Husband	-	-	43 (80)	17 (74)	60 (33)	-	-	31 (69)	43 (81)	74 (41)
Mother	11 (20)	15 (32)	-	1 (4)	27 (15)	3 (7)	7 (18)	-	-	10 (6)
Father/father in law/Son	-	-	11 (20)	1 (4)	12 (7)	-	-	14 (31)	4 (8)	18 (10)
All head of the family	56	47	54	23	180	42	40	45	53	180
Mean			0.45					0.43		
Std. deviation			0.499					0.497		

Source: Field survey, 2015

Table 3: Marital status of entrepreneurs and non-entrepreneurs

Marital status	Entrepreneurs' household					Non-entrepreneurs' household					t-test
	Garó	Khasia	Monipuri	Patro	All entre	Garó	Khasia	Monipuri	Patro	All non-entre	
Single	-	2 (4)	1 (2)	1 (4)	4 (2)	-	5 (13)	-	1 (2)	6 (3)	
Married	53 (95)	39 (83)	48 (89)	17 (74)	157 (87)	35 (83)	30 (75)	39 (87)	43 (81)	147 (82)	
Widow	3 (5)	6 (13)	5 (9)	5 (22)	19 (11)	7 (17)	5 (13)	6 (13)	9 (17)	27 (15)	3.631***
All marital status	56	47	54	23	180	42	40	45	53	180	
Mean			2.09					2.33			
Std. deviation			0.445					0.739			

Source: Field survey, 2015

female dominated society, despite male involved in formal economic activities. Thus, head of the family shows a positive but insignificant relationship between entrepreneur and non-entrepreneur tribal households. Table 7 indicates that large number (31%) of the entrepreneurs earned an estimated yearly income of above Tk 31500 in which *Khasia* covered about 36% of total followed by *Garo* (34%) and *Patro* (26%) respectively. The rest of the entrepreneurs (9, 26, and 30%) earned between Tk 25501-Tk 27500, Tk 27501-Tk 29500 and Tk 29501-Tk 31500 respectively. Considering the average income of entrepreneurs, it reveals that, Tk 29852, Tk 29727 and Tk 29797 are found for *Khasia*, *Monipuri* and *Patro* but *Garo* represented the higher income (Tk 30141) among them (Table 7).

Regarding non-entrepreneurs' income, a high variability is observed, the average income of non-entrepreneurs are Tk 27423 for *Garo*, Tk 27699 for *Khasia*, Tk 26307 for *Monipuri*, and Tk 27011 for *Patro* respectively. The average personal income of non-entrepreneurs is lower than entrepreneurs in the study areas. However, it is found that the estimated average annual income of entrepreneurs' personal income (Tk 29897) and non-entrepreneurs (Tk 27214) are very low than the national income (Tk 137748) reported by HIES, 2010. The result of t-test (8.545) indicates the significant differences and positive relationship between entrepreneur and non-entrepreneur tribal women.

Table 8 indicates that most of the member of entrepreneur's households (34%) are day labour as principal occupation and secondarily work as agriculture (21%). About 44% of *Monipuri* occupied agricultural work, while 50% of *Garo* are day labour. Table 8 also reveals that 43 and 18% of non-entrepreneur's family members engaged in day labour and rickshaw pulling respectively as their main occupations, whereas 16% in agriculture and that of 13% engaged in service in country. It is also observed from the findings that the increasing number of male and female of non-entrepreneurs are currently being engaged in tea garden and betel leaf processing as a day labour.

The highest (about 66%) amount of earning income spend on food item by *Khasia* households, followed by *Monipuri* and *Garo* about (61%), respectively. Table 9 showed the annual expenditure of non-entrepreneurs' household for food and non-food items. The highest average annual expenditure of non-entrepreneur amounted at Tk 58294 for *Monipuri* households followed by *Patro* (Tk 52819) and *Garo* (Tk 43128) respectively.

Table 7: The annual personal income of entrepreneurs and non-entrepreneurs

Personal income	Entrepreneurs tribal women					Non-entrepreneurs tribal women					All non-entre
	Garo	Khasia	Monipuri	Patro	All entre	Garo	Khasia	Monipuri	Patro	All non-entre	
Below 25500	2 (4)	3 (6)	2 (4)	-	7 (4)	1 (2)	3 (8)	11 (24)	2 (4)	17 (9)	
25501 to 27500	6 (11)	1 (2)	7 (13)	2 (9)	16 (9)	22 (52)	17 (43)	21 (47)	19 (36)	79 (44)	
27501 to 29500	11 (20)	11 (23)	15 (28)	10 (44)	47 (26)	16 (38)	14 (35)	9 (20)	23 (43)	62 (35)	
29501 to 31500	18 (32)	15 (32)	16 (30)	5 (22)	54 (30)	3 (7)	6 (15)	4 (9)	9 (17)	22 (12)	
Above 31500	19 (34)	17 (36)	14 (26)	6 (26)	56 (31)	-	-	-	-	-	
All income	56	47	54	23	180	42	40	45	53	180	
Average income	30141	29852	29727	29797	29897	27423	27699	26307	27011	27214	

Source: Field survey, 2015

Table 8: Occupational status of family members of respondents' households

Occupational status	Entrepreneurs' household					Non-entrepreneurs' household					t-test
	Garó	Khasia	Monipuri	Patro	All entre	Garó	Khasia	Monipuri	Patro	All non-entre	
Agriculture	4 (7)	-	24 (44)	9 (39)	37 (21)	3 (7)	-	14 (31)	12 (23)	29 (16)	
Business	5 (9)	4 (9)	9 (17)	3 (13)	21 (12)	3 (7)	4 (10)	7 (16)	4 (8)	18 (10)	
Rickshaw polling	12 (21)	13 (28)	6 (11)	3 (13)	34 (19)	8 (19)	7 (18)	4 (9)	14 (26)	33 (18)	0.436***
Day labourer	28 (50)	22 (47)	6 (11)	5 (22)	61 (34)	21 (50)	25 (63)	13 (29)	18 (34)	77 (43)	
Service (in country)	7 (13)	8 (17)	9 (17)	3 (13)	27 (15)	7 (17)	4 (10)	7 (16)	5 (9)	23 (13)	
All occupational status	56	47	54	23	180	42	40	45	53	180	

Source: Field survey, 2015.



Table 9: The annual expenditure of entrepreneurs and non-entrepreneurs' households

Head of expenditure	Entrepreneurs' household					Non-entrepreneurs' household					All non-entre (n=180)
	Garo (n=56)	Khasia (n=47)	Monipuri (n=54)	Patro (n=23)	All entre (n=180)	Garo (n=42)	Khasia (n=40)	Monipuri (n=45)	Patro (n=53)	All non-entre (n=180)	
Food	2013868 (61)	1702746 (66)	2403859 (61)	1926387 (49)	8046860 (59)	1257091 (69)	1133373 (67)	1710352 (65)	1724430 (62)	5825246 (65)	
Clothing	411400 (12)	310531 (12)	473725 (12)	943616 (24)	2139272 (16)	240912 (13)	207927 (12)	260225 (10)	313533 (11)	1022597 (11)	
Medicine	256462 (8)	63141 (2)	221202 (6)	366484 (9)	907289 (7)	36227 (2)	44994 (3)	162903 (6)	214994 (8)	459118 (5)	
Child education	494343 (15)	403691 (16)	505045 (13)	300704 (8)	1703783 (12)	172805 (10)	247126 (15)	261275 (10)	305135 (11)	986341 (11)	
Housing	42467 (1)	45027 (2)	115103 (3)	75176 (2)	277773 (2)	30431 (2)	36643 (2)	62434 (2)	70545 (3)	200053 (2)	
Other	99200 (3)	62624 (2)	196146 (5)	303053 (8)	661023 (5)	73904 (4)	34257 (2)	166051 (6)	170763 (6)	444975 (5)	
All head of expenditure	3317740	2587760	3915080	3915420	13736000	1811370	1704320	2623240	2799400	8938330	
Average expenditure	59245	55058	72501	170236	76311	43128	42608	58294	52819	49657	

Figure in the parenthesis indicate % of household annual expenditure

Source: Field survey, 2015

The average expenditure of entrepreneurs and non-entrepreneurs' household are lower than the national average (Tk 134400) expenditure (BBS, 2013). The overall average annual expenditure of non-entrepreneurs is amounted Tk 49657 which is lower than entrepreneurs' household expenditure (Tk 76311). The result of t-test (8.082) reveals that household expenditure varied significantly among the two categories of tribal women, non-entrepreneurs' household spend more money in food items (about 65%) compared to entrepreneurs, but in term of non-food items, entrepreneurs expend more money.

Table 10 indicates that relatively higher amount (43%) of total household annual income are earned by entrepreneurs of tribal women amounted Tk 52001 to Tk 72000 while only 7% of total earned below Tk 32000. On an average, the lowest household income is earned by *Khasia* entrepreneur (Tk 60005) in which about 15% of total income is below Tk 32000 and there are no any annual income in above Tk 72000. The highest average income is calculated for *Patro* entrepreneurs who earned 44% of total income between Tk 52001 to Tk 72000 per year followed by 30% is in above Tk 72000 respectively (Table 10).

Regarding non-entrepreneurs, it is also found that 51% non-entrepreneurs earned between Tk 32001 to Tk 52000. About 3% of non-entrepreneurs' households received below Tk 32000 per year. Considering both entrepreneurs and non-entrepreneurs households, it was found that the average income of entrepreneurs and non-entrepreneurs' households are Tk 84642 and Tk 52288 which are lower than the national average of Tk 137748 (HIES, 2010). It is therefore, noted that a significant variation of household income is found among two groups of tribal women in the study areas.

Ninety four percent of entrepreneur tribal women were selected having membership with NGOs and the remaining 6% were not involved with NGOs. Among those involved with NGOs, 71% had membership with one, 18% with two and the remaining 5% with three NGOs (Table 11). For non-entrepreneur tribal women, it is found that 59% were not involved with NGOs. They were asked why they do not join with NGOs. They pointed out that they have interest but family barriers, high interest rate, uncertainty of getting opportunities were major constraints to join with NGOs. On the other hand, the remaining 41% accepted loan from NGOs due to get different facilities such as children education, family treatment or marriage of son/daughter etc.

However, tribal women are continuously facing multi-dimensional difficulties that affected their participation in income generating activities as well as their improved socioeconomic status. The most important constraint confronted by

Table 10: The annual income of entrepreneurs' and non-entrepreneurs' households.

Household income	Entrepreneurs' household					Non-entrepreneurs' household					t-test
	Garro	Khasia	Monipuri	Patro	All groups	Garro	Khasia	Monipuri	Patro	All groups	
Below Tk 32000	-	7 (15)	4 (7)	2 (9)	13 (7)	-	4 (10)	-	1 (2)	5 (3)	
Tk 32001 to Tk 52000	12 (21)	24 (51)	16 (30)	4 (17)	56 (31)	32 (76)	26 (65)	10 (22)	23 (43)	91 (51)	9.266***
Tk 52001 to Tk 72000	33 (59)	16 (34)	19 (35)	10 (44)	78 (43)	10 (24)	10 (25)	26 (58)	21 (40)	67 (37)	
Above Tk 72000	11 (20)	-	15 (28)	7 (30)	33 (18)	-	-	9 (20)	8 (15)	17 (9)	
Total income	56	47	54	23	180	42	40	45	53	180	
Average income	67743	60005	81343	183876	84642	46094	45942	61415	54239	52288	

Source: Field survey, 2015

Figure in the parenthesis indicate % of household annual income

Table 11: Distribution of entrepreneur and non-entrepreneur tribal women based on membership with NGOs (n = 360)

Category	Entrepreneur tribal women (n=180)	Non-entrepreneur tribal women (n=360)	t-test
No membership with NGOs	11 (6)	107 (59)	
Membership with one NGOs	127 (71)	64 (36)	
Membership with two NGOs	33 (18)	9 (5)	11.899***
Membership with three NGOs	9 (5)	0	
Mean	1.22	0.46	
Std. deviation	0.630	0.592	

Source: Field survey, 2015

entrepreneur and non-entrepreneur women was 'lack of technical knowledge (as indicated by its CI of 238). They reported that due to poor educational background, they have less opportunity to collect up-to-date information in technical matters regarding local-based enterprises. The second most common constraint was 'lack of marketing channels' to develop enterprises. It indicates that they have lack of knowledge regarding product-base marketing channel. Due to lack of marketing channel, they usually receive fewer prices and have to sell their products to local buyer. 'Lack of business insurance schemes' was the 3<sup>rd</sup> most importantly counted problem for the tribal women.

Table 12: Constraints faced by tribal women in income generating activities

Constraints	Constraint level (%)				Constraint Index (CI <sub>c</sub> )
	Severe	Significant	insignificant	Not at all	
Lack of technical knowledge	56	30	10	4	238
Lack of marketing channel	61	14	15	10	226
Lack of capital to run enterprises	20	35	13	32	143
Less homestead area	46	24	10	20	169
Poor cooperation from family members	15	10	19	56	84
Lack of business insurance schemes	57	22	9	12	224
Poor infrastructure facilities; road, bridge, market etc.	15	10	10	65	75
High price of inputs	20	13	9	58	95
Poor health condition	16	11	45	28	115
Inadequate training programmes	34	26	21	19	175
Problem of geographical location	22	18	51	9	153

Source: Field survey, 2015

Product market always fluctuated but product cost is high. The majority of women reported that due to lack of insurance scheme, they cannot conduct a small business frequently. Due to natural calamities, production and sale both are hampered and sometimes they lost their investment as well. Less homestead area was marked as the 5<sup>th</sup> constraint. According to report by the women, the increasing population, expand the tea garden area and soil degradation of hill area decreased homestead land over time, ultimately reducing the scope of home-based small business around the houses, which was the most common in the study area. Problem of geographical location was also a barrier to conducting business. Most of them are living in hilly or plain land which is very far from city/town. They faced difficulties to contact with buyer or purchasing inputs or necessary things. Lack of financial support was another difficulty. In the study areas, women are very poor; do not have enough money to start a business. They reported that local NGOs provide loans ranging from Tk 5000 to Tk 20000 which are very inadequate for them to develop an enterprise. They also pointed out that poor health status was another barrier to conducting business. They often suffered from dysentery, skin diseases, and malnutrition. Tribal women mentioned that cooperation from family members is also low. Poor infrastructure facilities such as earthen roads and lack of bridges have been creating a marketing problem. During monsoon, they faced difficulties to travel on the muddy roads.

The tribal women were asked to give their opinion on possible solution to the constraints. In response to sufficient infrastructure development, a great number of majorities (75%) of them suggested that a number of initiatives might be taken by government to develop road, bridge, local market etc. About 53% of total women reported that proper marketing channel need to establish for easy access of produced products in addition with significant change for increasing women participation in enterprise activities. It is therefore, providing of adequate technical knowledge through training for getting modern information on improved livelihoods was another major perception, and need to provide financial support with low interest rate in time (58%). Here, lower percentage indicates the need first priority and higher percentage indicate least priority to overcome the constraints with small difference in percentage.

## **Conclusions**

Entrepreneurship amongst tribal women has been a recent phenomenon in Bangladesh. Though the role of tribal women still follow the code of customary beliefs which is different from mainstream people in many aspects, but nowadays they conscious about their existence, rights and work position by improving their

socioeconomic status. The government of Bangladesh (GoB) and NGOs continuously carry out various types of programmes (i.e. literacy training, skill training, savings mobilization and small loan distribution etc.) to improve their status. It may be that entrepreneur tribal women are in better position than non-entrepreneurs in terms of education, personal income, household income and expenditure, and association with NGOs or GOs etc. As a result, a significant improvement of entrepreneurs lies in the existence of resources within and outside of their communities. However, entrepreneurship development of tribal women have been made some positive impacts on socioeconomic situation. But some constraints such as poor infrastructure, inadequate training and financial support, lack of marketing channel, problem of geographical location still existed in the study areas. It was clearly apparent that tribal women were always trying to improve their socioeconomic status and played a crucial role in supplementing the family income. From this experience it would follow that infrastructure development and formation of short and long-term strategies by GOs, NGOs and other women development organizations with emphasis on the above mentioned constraints may help tribal women to improve their socioeconomic status.

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## The Impact of Export Revenue on Gross Domestic Product (GDP): Evidence from Bangladesh

SUDIP DEY\*

**Abstract:** *For Bangladesh, export revenue is a concern in the recent years. Hence, understanding the impact of export revenue on the macroeconomic variables such as GDP (gross domestic product) is essential for the policy makers of the recipient economy. The main objective of this study is to investigate the relationship between export revenue and GDP in Bangladesh. To test stationary, correlogram test is used. This study uses Granger causality and then co-integration test to investigate the long run relationship between GDP and export revenue in Bangladesh during the period of 1981-2015. The maximum lag length of the model is found by using Vector Autoregressive (VAR) lag order selection criteria. To analyze the data the model is formed by taking GDP as dependent variable and three variables (remittances, foreign direct investment, export revenue) as independent variables. Results of the correlogram test indicate that all the variables are non-stationary at level. But when these four variables are tested at first difference then the problem of non-stationary has disappeared and hence, they become stationary at first difference. Granger causality test indicates that there is bidirectional causality from export revenue to GDP in Bangladesh. Johansen co-integration test confirms the existence of the long-run equilibrium relationship between the variables of the model. The VECM presents that there is no statistically significant long run positive relationship between export revenue and GDP. But Bangladesh has indicated a statistically significant short run positive relation between export revenue and GDP.*

**Keywords:** *Export revenue, GDP, VAR, Co-integration, Vector Error Correction Model (VECM).*

\* Lecturer, Department of Economics, Premier University, Bangladesh,  
Email: sudipdey1899@gmail.com

## 1. Introduction

**Role of export revenue in Bangladesh:** Bangladesh is a developing country. It has a lot of natural resources. But proper utilization of our natural resources is not possible, because we do not have enough capital and technology. So, we are dependent on foreign trade. It is a process of creating economic relationship with other countries. Export is a potential weapon of developing the Bangladesh economy and can play an important role to reduce poverty. Growth of an economy is directly related to export. If export increase at a faster pace as compare to imports, nothing can stop an economy from being developed one. Exports are component of aggregate demand (AD). Rising exports will help increase AD and cause higher economic growth. Growth in exports can also have a knock-on effect to related 'Service Industries'. The strength of exports has a large role in determining the current account deficit. In a capital-poor country like Bangladesh, export can emerge as a significant factor to build up physical capital, create employment opportunities, develop productive capacity and help integrate the domestic economy. Bangladesh's export earnings are mostly determined by the export of readymade garments (RMG) to North American and European countries with 75% of total export earning coming from this sector. Readymade garments are the largest export industry and determine the dynamics of total export earnings for Bangladesh. It is still growing at a satisfactory rate.

The RMG sector contributes around three quarters of total export earnings. An estimated 4.2 million people are employed in the sector, most are women, half of whom come in from rural areas and villages.

By 2013 there were approximately 5000 factories, part of Bangladesh's US\$19 billion a year export-oriented RMG industry has revolutionized the country in terms of its contribution to GDP growth. Bangladesh export goods and services to UK, USA, Canada, Japan, Australia, New Zealand and Russia etc. Markets are also opening up in the Middle East, Latin America and Africa.

**Role of Remittances in Bangladesh:** The role of remittances in the economies labor sending countries like Bangladesh is assuming increasing importance. The effects of remittance on the macro economy of a country are universally proved. The incoming foreign exchange helps receiving countries to pay import liabilities, improve their position in balance of payments, strengthen foreign exchange reserves and finance external debt. Studies indicate that remittances may raise per capita income and reduce poverty in our country. For example a 10% increase in the share of remittance to GDP in a given country would lead to a 1.6% decline in the share of people living in poverty. Remittances advance human development outcomes.

Studies based on household surveys exhibit that children from remittance receiving households have a lower school dropout rate and three households spend more on private tuition for their children. Remittance also play an important role in smoothening household consumption basically respond positively in case of adverse shocks relating to natural disasters, crop failure, job loss and health crisis. Remittance can diminish poverty through augmenting the income of recipient households, through indirect multiplier effects and through their macroeconomic effects. The Keynesian multiplier theory suggests that even if the remittances are totally spent on consumption there will still be benefit to the receiving economy, to the extent the funds are spent on local goods and services. As one of the Least Developed Countries (LDC), foreign currency is needed for socio-economic development. Remittances help Bangladesh to make investments for industrial development, modernize its industries by importing high-tech machineries for export-oriented manufacturing, modernize its agriculture, invest in education, etc. On the other hand, these factors create more employment in the country to increase its export of manufactured goods as opposed to agricultural products, raw materials, low quality finished products etc., as they were in the past.

**Role of FDI in Bangladesh:** Foreign direct investment (FDI) is defined as a long-term investment by a foreign direct investor in and enterprise resident in an economy other than that in which the foreign direct investor is based. As a developing country, Bangladesh needs FDI for its ongoing development process. The total inflow of FDI has been increasing over the years. In 1972, annual FDI inflow was 0.090 million USD and after 33 years, in 2005 annual FDI came to 845.30 million USD and to 989 million USD in 2006. FDI promote competition in the domestic input market. Profits generated by FDI contribute to the corporate revenue in the host country. Operation of new ventures by FDI leads to employee learning in the host countries that learn how to manage and operate the business. This contributes to human capital development of the host country. FDI allows transfer of capital and technology, which is not possible through financial investment in goods and services. Profits generated by FDI contribute to tax revenue in the host country like Bangladesh. FDI is recognized as a powerful engine for economic growth. It enables capital poor country like Bangladesh to build up physical capital, create employment opportunities, develop productive capacity, enhance skills of local labor through transfer of technology and managerial know-how, and help integrate the domestic economy with the global economy.

In Bangladesh, FDI inflows are reported under the capital and financial account of the country's Balance of Payments (BOP) which provides the direct effect on the BOP. Thus the inflow of FDI plays an important role in determining the surplus/deficit in the capital and financial account of the BOP statement. So the impact of FDI on Bangladesh's BOP is positive. Some positive sides of FDI are given below:

- a. Increase productive efficiency due to competition from multinational subsidiaries.
- b. Improve the quality of the factors of production including management in other firms, not just the host firm.
- c. Increase the export revenue.
- d. Increase the savings and investment.
- e. Certain faster growth and employment.

## **2. Literature review**

Afaf Andull J. Saeed and Majeed Ali Hussain (2015) showed that there is unidirectional causality between exports and economic growth. These results provide that growth in Tunisia was propelled by a growth-led import strategy as well as export led import. Imports are thus seen as the source of economic growth in Tunisia. Muhammad A. Quddus and Ikram Saeed (2005) examined if export and GDP are co-integrated by the using Johansen approach; whether export Granger cause GDP growth; whether Granger cause investment. A positive Granger causal relationship running from export to economic growth is suggested by the test results for the long-run period. Majeed A. Hussain (2014) found that there is Granger causality relationship between exports and economic growth in Pakistan. The relationship between exports and economic growth has long been a subject of great interest in the development literature. Zahoor Hussain Javed, Imran Qaiser Anam Mushtaq Saif-ullaha, Ashraf Iqbal (2012) Proved that explanatory variable (export) has positive and significant impact on the economy of Pakistan. The results also showed that international trade may play an important role to enrich the economy of Pakistan. Mushfica Akter(2015) revealed that the impact of export on economic growth found as positive and an opposite scenario is investigated in the case of import. Haydory Akbar Ahmed and Md. Gazi Salah Uddin(2009) examined that time series analysis indicate exports, imports and remittances cause GDP growth in the short run but has no long run impact. The causal nexus unidirectional long run GDP growth causes short run income growth but this affect is once again unidirectional. Using Johansen's multivariate approach to co-integration, and using imports and remittance as

additional variables, findings suggest that real GDP, real exports, real imports and real remittance are co-integrated for Bangladesh, implying a long run relationship amongst all three variables. Sri-Lankan economist Velnamby. T and Achchuthan.S(2013) showed that, the export and import have the significant positive relations with each other, and also, both export and import have the significant impact on the economic growth. Aisha Ismail, Khalid Zaman, Rao Muhammad Atif, Abida Jadoo and Rabia Seemab(2010) examined a long-run relationship between the variables (export and GDP) has been found by Johansen's co-integration test. The error correction model has been applied to streamline of the variables on economic growth. Dr. Sushil Kumar Rai, Ms. Purvashree Jhala (2015) showed that, there is a positive relationship between growth rate and exports. Rummana Zaheer, Sanam Wagma Khattak, Huma Ashar and Khanzaib (2014) indicated that both variables exports and imports have significant relationship with growth rate. So government should move towards more exchange rate liberalization policy in order to increase its economic growth. In this paper I want to investigate the relationship between export revenue and its impact on GDP in Bangladesh using the time series analysis.

### **3. Methodology**

Since the issue of causality is at the foundation of any study that examines an economic relationship, the empirical analysis starts with the Granger-causality tests to determine if export revenue Granger –causes GDP and/or inversely GDP Granger-cause export revenue. Correlogram test is used for testing the time series data are stationary or not. For optimal lag length selection I used Vector Autoregressive (VAR) model. To test the long run relationship between GDP and export revenue Johansen co-integration test is run. Also error correction model is used to verify short run dynamics with long-run equilibrium. There are techniques for error correction model, such as the VECM which is more significant for multivariate framework. All of the econometric tests are done by Eviews-7 and SPSS-20.

### **4. Data Sources**

Annual data of the variables of the model over the 1981-2015 periods in Bangladesh are collected from various secondary sources. Data on GDP is taken from World Bank. Data on remittances and export revenue are collected from Bangladesh Economic Review. The data on FDI is taken from various kinds of sources like Bangladesh Bank, and Bangladesh Bureau of Statistics.

## 5. Model Specification

In order to examine the impact of export revenue on GDP, I have specified following econometric model. The independent variables are remittance, FDI, export revenue, while the dependent variable is GDP. The model is stated as follows:

$$GDP = f(\text{remittance}, FDI, \text{export revenue})$$

$$\text{Or } GDP_t = \alpha + \beta \text{Rem}_t + \delta FDI_t + \sigma \text{Exr}_t + U_t$$

Where, GDP = Gross Domestic Product, Rem = Remittances, FDI = Foreign Direct Investment, Exr = Export revenue. All the variables are counted in Million \$US.  $\alpha, \beta, \delta, \sigma$  = parameters to be estimate, U = Stochastic term, and  $t = 1, 2, 3, \dots, 35$  (time period from 1981-2015).

### 5.1. Testing for stationary/Non-stationary:

One simple test of stationary is based on the so-called autocorrelation function (ACF). The ACF at lag  $\rho_k$ , denoted by, is defined as

$$\rho_k = \frac{\gamma_k}{\gamma_0} = \text{covariance at lag } k / \text{Variance.}$$

Since both covariance and variance are measured in the same units of measurement,  $\rho_k$  is unit less, or pure, number. It lies between -1 and +1, as any correlation coefficient does. If we plot  $\rho_k$  against  $k$ , the graph we obtain is known as the population correlogram. If we have a realization of a stochastic process, we can only compute the sample autocorrelation function (SAFC),  $\rho_k$ . To compute the sample covariance at lag  $k, \gamma_k$ , and the sample variance,  $\gamma$ , which are defined as

$$\hat{\gamma}_k = \frac{\sum (Y_t - \bar{Y})(Y_{t+k} - \bar{Y})}{n}$$

$$\hat{\gamma}_0 = \frac{\sum (Y_t - \bar{Y})^2}{n}$$

Where  $n$  is the sample size and  $\bar{Y}$  is the sample mean. Therefore, the sample autocorrelation function at lag  $k$  is

$$\hat{\rho}_k = \frac{\hat{\gamma}_k}{\hat{\gamma}_0}$$

Which is simply the ratio of sample covariance (at lag  $k$ ) to sample variance. A plot of  $\rho_k$  against  $k$  is known as the sample correlogram.

### 5.2. The Granger Causality test

For Granger Causality test, we will consider the often asked question in Macroeconomics: Is it GDP “causes” the export revenue or is it the export

revenue that “causes” GDP. The Granger causality test assumes that the information relevant to the prediction of the respective variables, GDP and export revenue, is consider solely in the time series data on these variables. The test involves estimating the following pair of regressions:

$$GDP_t = \sum_{i=1}^p \omega_i \text{Exr}_{t-i} + \sum_{i=1}^p \varphi_i \text{GDP}_{t-i} + u_{1t} \dots \dots \dots (1)$$

$$\text{Exr}_t = \sum_{i=1}^p \lambda_i \text{Exr}_{t-i} + \sum_{i=1}^p \nu_i \text{GDP}_{t-i} + u_{2t} \dots \dots \dots (2)$$

Equation (1) postulates that current GDP is related to past values of itself as well as that of Exr, and (2) postulates a similar behavior for Exr. It is assumes that the disturbances  $u_{1t}$  and  $u_{2t}$  are uncorrelated.

**5.3. Johansen Co-integration test**

Co-integration analysis helps to indentify long-run relationship among the variables. Two variables are said to be co-integrated, if they have same stochastic trend. This test depends on his Maximum Likelihood (ML) estimator of the parameters of the following VEC model of two co-integrating variables. For determining the number of lags in the co-integration test (VAR), we use the FPE: Final Prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and the HQ: Hannan-Quinn information criterion. To indentify the number of co-integrating vectors present, we use the trace and maximal eigenvalue tests. We then estimate the VECM for all the endogenous variables in the model and use it to carry out tests such as Granger causality tests over the short and long run. Furthermore, for understanding the interactions of the variables we carry out variance decomposition tests. Johansen-Juselius Multivariate Co-integration Model under vector autoregressive environment,-

$$\Delta X_t = \sum_{i=1}^{p-1} \mu_i \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t \dots \dots \dots (3)$$

Where,  $X_t$  is the (2\*1) vector respectively,  $\Delta$  is a symbol of difference operator,  $\varepsilon_t$  is a (2\*1) vector of residuals. The vector error model has information about the short and long-run adjustment to changes in  $X_t$ , via the estimated parameters  $\mu_i$  and, respectively. Here,  $\Pi X_{t-1}$  is the error correction term and  $\Pi$  can be factored into two separate matrices  $\alpha$  and  $\beta$ , such as  $\Pi = \alpha\beta$  where  $\beta$  denotes the vector of co-integrating parameters while  $\alpha$  is the vector of error-correction co-efficient measuring the speed of convergence to the long-run steady state.

**5.4. Vector Error Correction Model (VECM)**

There can be a long-run relationship between two series in a bivariate relationship, if each series is integrated of the same order or have the same

stochastic trend. If co-integration has been detected between the series, then there exists a long-run equilibrium relationship between them. So we apply VECM in order to evaluate the short run properties of the co-integrated series. In case of no co-integration VECM is no longer required and we directly precede to Granger causality tests to establish causal links between variables. The regression equation form of VECM is as follows:

$$\Delta Y_t = \alpha_1 + p_1 e_1 + \sum_{i=0}^m \beta_i \Delta Y_{t-i} + \sum_{i=0}^m \delta_i \Delta X_{t-i} + \sum_{i=0}^m \gamma_i \Delta Z_{t-i} \dots \dots (4)$$

$$\Delta X_t = \alpha_2 + p_2 e_2 + \sum_{i=0}^m \beta_i \Delta Y_{t-i} + \sum_{i=0}^m \delta_i \Delta X_{t-i} + \sum_{i=0}^m \gamma_i \Delta Z_{t-i} \dots \dots (5)$$

## 6. Results and Discussion

### 6.1. Correlogram Test

Correlogram test is used to check the variables are stationary or not. The results have shown that all the variables are non-stationary at level. But when these variables are tested at first difference then the null hypothesis is accepted and the

Table 1

VAR Lag Order Selection Criteria  
 Endogenous variables: GDP REM FDI EXR  
 Exogenous variables: C  
 Date: 12/30/16 Time: 04:54  
 Sample: 1 35  
 Included observations: 32

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1159.305	NA	4.43e+26	72.70658	72.88979	72.76731
1	-1049.686	184.9827	1.29e+24	66.85537	67.77145	67.15902
2	-1017.410	46.39651	4.90e+23	65.83813	67.48708	66.38471
3	-948.0863	82.32190*	2.01e+22*	62.50539*	64.88721*	63.29490*

\* indicates lag order selected by the criterion  
 LR: sequential modified LR test statistic (each test at 5% level)  
 FPE: Final prediction error  
 AIC: Akaike information criterion  
 SC: Schwarz information criterion  
 HQ: Hannan-Quinn information criterion



alternative hypothesis is rejected. Because all variables p-values  $> 0.05$  (5%). That means all variables are stationary at first difference and their integrated order is one or I(1).

## 6.2. Optimal Lag Length Selection

After the correlogram test, the maximum lag length of the model is found by using Vector Autoregressive (VAR) lag order selection criteria. The results are shown into the Table-1 and it has confirmed that the maximum lag length of the model is '3' and it is selected on the basis of the minimum value of each criterion and based on that the maximum number of 'lag 3' should be chosen. All criteria are asking to take 3lag. So our optimum lag would be '3' and we should use it in Johansen co-integration test and vector error correction model.

Table 2

Pairwise Granger Causality Tests

Date: 01/05/17 Time: 11:58

Sample: 1 35

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
D(REM) does not Granger Cause D(GDP)	31	1.30757	0.2949
D(GDP) does not Granger Cause D(REM)		15.5761	8.E-06
D(FDI) does not Granger Cause D(GDP)	31	1.59136	0.2175
D(GDP) does not Granger Cause D(FDI)		8.83668	0.0004
D(EXR) does not Granger Cause D(GDP)	31	38.1572	3.E-09
D(GDP) does not Granger Cause D(EXR)		26.6660	8.E-08
D(FDI) does not Granger Cause D(REM)	31	4.22304	0.0156
D(REM) does not Granger Cause D(FDI)		5.44588	0.0053
D(EXR) does not Granger Cause D(REM)	31	9.77387	0.0002
D(REM) does not Granger Cause D(EXR)		6.24278	0.0028
D(EXR) does not Granger Cause D(FDI)	31	5.64386	0.0045
D(FDI) does not Granger Cause D(EXR)		19.8485	1.E-06

### 6.3. Granger causality test

The study examines the relationship between GDP and export revenue first using Granger causality analysis for Bangladesh over the period 1981-2015. The Granger causality approach provides a plausible technique to consider both lagged and endogenous relationship. The results of causality between GDP, Rem, FDI and Exr are contained in table-2. The empirical result shows a bidirectional relationship between GDP and Export revenue in Bangladesh. The results of the test are given below:

Table 3

Date: 12/30/16 Time: 04:56

Sample (adjusted): 5 35

Included observations: 31 after adjustments

Trend assumption: Linear deterministic trend

Series: GDP REM FDI EXR

Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.953238	118.9662	47.85613	0.0000
At most 1	0.433196	24.02277	29.79707	0.1995
At most 2	0.153862	6.422759	15.49471	0.6455
At most 3	0.039319	1.243513	3.841466	0.2648

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max- Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.953238	94.94344	27.58434	0.0000
At most 1	0.433196	17.60001	21.13162	0.1455
At most 2	0.153862	5.179246	14.26460	0.7190
At most 3	0.039319	1.243513	3.841466	0.2648

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

**6.4. Johansen Test of co-integration**

The precondition for Johansen co-integration test is, the variables must be non-stationary at level but when we convert all the variables into first difference, then they will become stationary. Only then we can run the Johansen co-integration test. Here all of my variables are stationary at first difference, so we can run co-integration test. Table-3 shows the presence of co-integration for the variables adopted in this study, where it is statistically valid. This implies that there is a long-run relationship amongst GDP, remittance, FDI and export revenue. Max Eigenvalue test indicates 1 co-integrating equation at the 0.05 level. Trace indicates 1 co-integrating equation at the 0.05 level. \* denotes rejection of the hypothesis at the 0.05 level. The results of the Trace tests indicate the presence that the two variables are co-integrated vectors.

**6.5. Vector Error Correction Model**

As the four variables are co-integrated we can run VECM model. In the previous test, we have seen that the variables are co-integrated and there is a long run relationship among the variables. So in this case we can run VECM. In this paper I used multivariate framework, which is given below:

$$\Delta GDP_t = \alpha_{10} + \alpha_{GDP} \hat{e}_{t-1} + \sum_{i=1}^m \alpha_{11}(i) \Delta GDP_{t-i} + \sum_{i=1}^m \alpha_{12}(i) \Delta Rem_{t-i} + \sum_{i=1}^m \alpha_{13}(i) \Delta FDI_{t-i} + \sum_{i=1}^m \alpha_{14}(i) \Delta Exr_{t-i} + \varepsilon_{(GDP)t} \dots\dots\dots(6)$$

The other three equations in the ECM model system are:

$$\Delta Rem_t = \alpha_{20} + \alpha_{Rem} \hat{e}_{t-1} + \sum_{i=1}^m \alpha_{21}(i) \Delta GDP_{t-i} + \sum_{i=1}^m \alpha_{22}(i) \Delta Rem_{t-i} + \sum_{i=1}^m \alpha_{23}(i) \Delta FDI_{t-i} + \sum_{i=1}^m \alpha_{24}(i) \Delta Exr_{t-i} + \varepsilon_{(Rem)t} \dots\dots\dots(7)$$

$$\Delta FDI_t = \alpha_{30} + \alpha_{FDI} \hat{e}_{t-1} + \sum_{i=1}^m \alpha_{31}(i) \Delta GDP_{t-i} + \sum_{i=1}^m \alpha_{32}(i) \Delta Rem_{t-i} + \sum_{i=1}^m \alpha_{33}(i) \Delta FDI_{t-i} + \sum_{i=1}^m \alpha_{34}(i) \Delta Exr_{t-i} + \varepsilon_{(FDI)t} \dots\dots\dots(8)$$

$$\Delta Exr_t = \alpha_{40} + \alpha_{Exr} \hat{e}_{t-1} + \sum_{i=1}^m \alpha_{41}(i) \Delta GDP_{t-i} + \sum_{i=1}^m \alpha_{42}(i) Rem_{t-i} + \sum_{i=1}^m \alpha_{43}(i) \Delta FDI_{t-i} + \sum_{i=1}^m \alpha_{44}(i) \Delta Exr_{t-i} + \varepsilon_{(Exr)t} \dots\dots\dots(9)$$

Where,  $\alpha_i$  is the error-correction term, which is the co-integrating vectors and  $\alpha_i$  is the adjustment coefficient indicating the weight of adjusted disequilibrium in the past. If the variables have long-run relationship, the co-efficient of  $\alpha_i$  must be statistically significant.  $\alpha_{10}$ ,  $\alpha_{GDP}$ , and  $\alpha_{11}$  (i) are the parameters, an  $\varepsilon_{it}$  is the white-noise disturbance terms. In table-4 C(1) is the speed of adjustment towards long run equilibrium but it must be significant and the sign must be negative. From our results (Table-4) we can see that C(1) is negative(-0.0220220) but the p-value, (0.8523) > 0.05. So, there is no long run causality from the three independent variables (Rem, FDI, Exr). It means that Rem, FDI and Exr have no influence on the dependent variable GDP in the long run. In other words there is no long run causality running from Rem, FDI and Exr to GDP. The results are given below:

Table 4

Dependent Variable: D(GDP)  
Method: Least Squares  
Date: 12/30/16 Time: 04:59  
Sample (adjusted): 5 35  
Included observations: 31 after adjustments

$$D(GDP) = C(1)*(GDP(-1) - 26.5640629593*REM(-1) + 229.12319484*FDI(-1) - 4.70907382612*EXR(-1) + 2237.39742401) + C(2)*D(GDP(-1)) + C(3)*D(GDP(-2)) + C(4)*D(GDP(-3)) + C(5)*D(REM(-1)) + C(6)*D(REM(-2)) + C(7)*D(REM(-3)) + C(8)*D(FDI(-1)) + C(9)*D(FDI(-2)) + C(10)*D(FDI(-3)) + C(11)*D(EXR(-1)) + C(12)*D(EXR(-2)) + C(13)*D(EXR(-3)) + C(14)$$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.022020	0.116494	-0.189026	0.8523
C(2)	0.144955	0.194823	0.744033	0.4670
C(3)	0.067075	0.226821	0.295719	0.7710
C(4)	0.046506	0.588714	0.078996	0.9380
C(5)	-4.582433	4.269568	-1.073278	0.2981
C(6)	-4.023298	4.945088	-0.813595	0.4271
C(7)	-0.416980	4.623882	-0.090180	0.9292
C(8)	0.746194	24.52954	0.030420	0.9761
C(9)	0.862665	16.92070	0.050983	0.9599
C(10)	-15.02848	17.49347	-0.859091	0.4022
C(11)	1.408499	2.245559	0.627238	0.5388
C(12)	-0.400249	1.750651	-0.228629	0.8219
C(13)	10.42977	2.043848	5.103004	0.0001
C(14)	-660.5104	1303.875	-0.506575	0.6190
R-squared	0.938037	Mean dependent var		5536.903
Adjusted R-squared	0.890654	S.D. dependent var		11442.86
S.E. of regression	3783.867	Akaike info criterion		19.61733
Sum squared resid	2.43E+08	Schwarz criterion		20.26494
Log likelihood	-290.0687	Hannan-Quinn criter.		19.82844
F-statistic	19.79682	Durbin-Watson stat		1.946862
Prob(F-statistic)	0.000000			

Table 5

Wald Test: Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	13.11311	(3, 17)	0.0001
Chi-square	39.33934	3	0.0000

Null Hypothesis: C(11)=C(12)=C(13)=0 Null Hypothesis Summary:		
Normalized Restriction (= 0)	Value	Std. Err.
C(11)	1.408499	2.245559
C(12)	-0.400249	1.750651
C(13)	10.42977	2.043848

Restrictions are linear in coefficients.

### 6.6. Wald test

I used Wald Statistics to check the short run causality. Here, the null hypothesis is,  $H_0: C(11)=C(12)=C(13)=0$  (There is no short run causality from export revenue to GDP). According to test results (Table-5), we can reject the Null hypothesis, because our p-value (0.000) < 0.05. So there is short run causality from export revenue to GDP. The results of the test are given below:

### 7. Conclusion

The main objective of this study was to investigate the impact of export revenue on GDP in Bangladesh. Annual time series data for the period of 1981-2015 are used in the study, co-integration and error correction models are used to find the long run and short run relationship between the export revenue and GDP for Bangladesh. The methodology is employed in the study include the regression analysis to examine the impact; stationary test is carried out using the correlogram test. The empirical results suggest that, there exists bidirectional causality in Granger causality test. There is a long run relationship among the variables in co-integration test but short run causality in vector error correction model form export revenue to GDP. So Government needs to take proper steps for improving exports to increase our economic growth.

**Appendix***Correlogram of D (GDP)*

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.  **	.  **	1	0.338	0.338	4.2336	0.040
.  **	.  **	2	0.310	0.221	7.9092	0.049
.  .	. * .	3	0.067	-0.106	8.0873	0.044
.  .	.  .	4	0.054	-0.008	8.2055	0.084
.  .	.  .	5	0.046	0.058	8.2934	0.141
.  .	.  .	6	0.038	0.009	8.3578	0.213
.  .	.  .	7	0.034	-0.001	8.4096	0.298
.  .	.  .	8	0.018	-0.001	8.4253	0.393
.  .	.  .	9	0.014	0.004	8.4352	0.491
.  .	.  .	10	-0.002	-0.012	8.4355	0.586
.  .	.  .	11	-0.016	-0.020	8.4485	0.673
.  .	.  .	12	-0.019	-0.008	8.4694	0.747
.  .	.  .	13	-0.023	-0.008	8.4994	0.810
.  .	.  .	14	0.024	0.046	8.5349	0.860
. * .	. * .	15	-0.105	-0.140	9.2471	0.864
.  .	.  .	16	-0.044	0.000	9.3771	0.897

*Correlogram of D (Rem)*

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. *	. *	1	0.119	0.119	0.5266	0.468
. **	. **	2	0.297	0.287	3.9116	0.141
. .	. .	3	0.024	-0.039	3.9347	0.269
. .	. .	4	0.038	-0.051	3.9933	0.407
. *	. *	5	0.086	0.101	4.3021	0.507
. .	. .	6	-0.043	-0.062	4.3811	0.625
.* .	.* .	7	-0.137	-0.203	5.2378	0.631
** .	* .	8	-0.212	-0.170	7.3624	0.498
.* .	. .	9	-0.116	0.016	8.0250	0.532
.* .	. .	10	-0.090	0.019	8.4390	0.586
. .	. .	11	-0.047	-0.015	8.5550	0.663
. .	. .	12	-0.047	0.006	8.6774	0.730
. .	. .	13	-0.060	-0.011	8.8899	0.781
.* .	* .	14	-0.098	-0.124	9.4773	0.799
. .	. .	15	0.001	-0.024	9.4773	0.851
. .	. .	16	-0.040	-0.031	9.5841	0.887

*Correlogram of D (FDI)*

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
** .	** .	1	-0.294	-0.294	3.1956	0.074
. .	.* .	2	-0.046	-0.144	3.2757	0.194
. .	. .	3	0.011	-0.053	3.2801	0.350
. .	. .	4	0.022	0.003	3.3001	0.509
. .	. .	5	-0.025	-0.020	3.3274	0.650
. **	. **	6	0.255	0.275	6.1793	0.403
** .	. .	7	-0.219	-0.063	8.3475	0.303
. .	.* .	8	-0.025	-0.079	8.3774	0.397
. *	. *	9	0.162	0.125	9.6657	0.378
. .	. .	10	-0.026	0.040	9.6990	0.467
. .	. .	11	-0.031	-0.003	9.7488	0.553
.* .	** .	12	-0.130	-0.230	10.686	0.556
. .	.* .	13	-0.033	-0.100	10.751	0.632
. *	. .	14	0.092	0.039	11.268	0.665
. .	.* .	15	-0.034	-0.111	11.343	0.728
. .	. .	16	0.016	0.044	11.361	0.787



*Correlogram of D (Exr)*

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. * .	. * .	1	0.099	0.099	0.3605	0.548
. .	. .	2	0.009	-0.001	0.3636	0.834
. .	. .	3	0.054	0.053	0.4770	0.924
. .	. .	4	0.033	0.022	0.5202	0.972
** .	** .	5	-0.296	-0.306	4.2286	0.517
. .	. * .	6	0.059	0.131	4.3828	0.625
. .	. .	7	-0.001	-0.026	4.3828	0.735
. .	. .	8	-0.048	-0.020	4.4913	0.810
.* .	.* .	9	-0.092	-0.076	4.9080	0.842
.* .	.* .	10	-0.071	-0.170	5.1664	0.880
. .	. .	11	-0.043	0.059	5.2666	0.918
.* .	.* .	12	-0.066	-0.083	5.5111	0.939
. .	. .	13	0.004	0.026	5.5121	0.962
. .	. .	14	0.055	0.022	5.6953	0.974
. .	.* .	15	-0.030	-0.116	5.7546	0.984
. .	. * .	16	0.017	0.079	5.7743	0.990

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## Investing in Infrastructure: Building for the Long Term

SONJOY CHAKRABORTY\*

**Abstract:** *Infrastructure is the engine of growth, especially, for the developing economies. Considering this idea, all the countries in the world are very much anxious for the future investment in infrastructure. Over the last 18 years (before 2013) global infrastructure investment was 36 trillion USD. According to a report from consultant McKinsey & Co., about \$57 trillion will be needed to finance infrastructure development around the world through 2030. But if 3% of total Global GDP is spent for infrastructure, then the total shortage is \$8.4 trillion, that is, yearly more than 500 \$billion. As infrastructure is public goods in nature, as well as large volume of financing is involved and return of capital is comparatively low and slow (though reliable), market mechanism does not function efficiently. For this reason, to fulfill this shortage national and international organization has to launch special incentives or measures to attract the private investment in infrastructure.*

**Key Words:** *Infrastructure, Public Goods, Public Private Partnership*

### 1. Introduction

Infrastructural Investment is essential for the long term economic development of a country. Key infrastructure assets create additional economic benefits by supporting urbanisation and industrial growth and providing better access to adjoining countries and stronger trade links. This, in turn, accelerates growth in GDP per capita and therefore the ability to derive greater financial returns. Sensible investment has a much higher better chance of paying dividends when macroeconomic policies are sound, but at the same time, high-return

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\* Deputy Secretary, Prime Minister's Office, Bangladesh

infrastructure investment is harder to identify and implement in developed countries where most obvious investments have already been made (Rajon, 2015). So, to improve the understanding of project selection and finance is a very important matter. Infrastructure development creates the linkage between developed and undeveloped nations. Due to the characteristics of positive spillover effect of the infrastructure, undeveloped nation's infrastructural investment should get the top priority for the creation of the better world.

## **2. Literature Review**

Henckel (2010) explains that although infrastructure is widely recognized as a key ingredient in a country's economic success, many issues surrounding infrastructure spending are not well understood. In order to better understand these issues, a conference was convened in March 2010 in Sydney, Australia, with leading international experts to explore the many aspects of infrastructure. The discussion at the conference was divided into six themes: the returns to infrastructure, the role of the private sector, the evaluation and delivery of infrastructure in practice, the nature of network industries, pricing and regulation, political economy considerations of infrastructure provision, and infrastructure in developing countries. In this presentation he concluded that Indeed, although there are potentially large theoretical gains of infrastructure investment for economic growth, the efficacy of infrastructure spending in practice is at best mixed.

Wehinger (2011) in his study on OECD countries, Covered the topics of financial reform to foster stability and long-term growth, the contribution of institutional investors to long-term growth, and creating a better environment for the financing of business innovation and green growth. With stressed public sector finances, private capital needs to fill the funding gap for infrastructure and other long-term projects. Appropriate regulatory incentives to overcome short-termism, as well as risk-sharing arrangements e.g. via public-private partnerships, are needed in order to encourage market-based, long-term investment and risk capital financing. Better transparency, information and investor education can also play a role in enhancing long-term savings and investment.

ARCADIS (2014), prepared the Second global Infrastructure Investment Index 2014. To support this growing sector ARCADIS has created its second Global Infrastructure Investment Index, which highlights the most dynamic and attractive markets for infrastructure investment worldwide. The Global Infrastructure Investment Index ranks the world's 41 most dynamic countries with the greatest potential for growth and investment in their economic infrastructure. Economic

infrastructure comprises the infrastructure that makes business activity as possible, such as transportation, communication, distribution and energy assets. A total of 26 individual criteria in five key areas (Economy, Business, Risk, Infrastructure, Finance) are analysed and given a weighting which then creates an overall score for each market. The indicators selected are those most pertinent to investors when making an investment in infrastructure. Most weighting goes to indicators of dynamism, but the overall blend creates the final ranking. There are, of course, specific risks in each market and the analysis in this report offers insight into the characteristics and opportunities in these countries. The most attractive markets for investment in infrastructure combine strong growth potential and high levels of investment with low risk, business friendly environments. In general terms, as the index falls away the risk profiles of the countries increase, so therefore, must the returns sought by investors. Among the 41 comparing countries, Singapore places the first position and Venezuela is in the last position.

Deau(2011) mentions that Mobilising private sector funding is essential in bridging the infrastructure funding gap. This can be done by appropriate regulation, targeted public financial support, and active involvement by institutional investors. Creating an appropriate policy framework and lifting regulatory constraints on long-term investments will foster financial stability of retirement savings systems and enable the development of strategic infrastructure projects that contribute to long-term growth. As capital markets and bank funding have dried up as sources of infrastructure financing after the global financial crisis, finding alternative long-term debt sources is critical. Private infrastructure financing can be promoted by targeted public measures and by building an infrastructure management culture amongst asset managers. Infrastructure investments also require long-term policy planning, with long-term strategic policy frameworks that exceed political cycles and are built on wide political consensus. Stable and accessible programmes of infrastructure projects and public-private partnerships (PPPs) are key in attracting private sector investors, complemented by adequate regulation.

Coelho, studied on infrastructural investment in Bangladesh as a case study. He tries to explore, Does it play role as sustainable development? The paper reports on ethnographic case studies of the impacts of rural road improvement in Bangladesh, outlining the implication of such a shift. The case studies also outline pattern of rural urban, national linkages facilitated by improved roads, and the effect of integration into urban, national and global economies and rural livelihood. They suggest that sustainable infrastructure assets does not always accompany the sustainable development process.

Blanc-Brude, Matching the huge demand for capital investment in infrastructure projects around the world with the available supply of long-term funds by institutional investors -- be they pension funds, insurers or sovereign wealth funds -- has never been so high on the international policy agenda. This policy momentum, illustrated by the recent focus on long-term investment in infrastructure by the G20, coincides with the steadily growing investment appetite from institutional investors for unlisted and illiquid assets. However, solid evidence supporting the infrastructure investment narrative is still missing, and full-fledged investment solutions demonstrating the benefits of infrastructure investment for institutional investors remain elusive. Today, documenting the investment characteristics of long-term investment in infrastructure has become a pressing question.

Loayza et al. (2010) presented that in the past half a century, Egypt has experienced remarkable progress in the provision of infrastructure in all areas, including transportation, telecommunication, power generation, and water and sanitation. Judging from an international perspective, Egypt has achieved an infrastructure status that closely corresponds to what could be expected given its national income level. The present infrastructure status is the result of decades of purposeful investment. In the past 15 years, however, a worrisome trend has emerged: Infrastructure investment has suffered a substantial decline, which may be at odds with the country's goals of raising economic growth. Improving infrastructure in Egypt would require a combination of larger infrastructure expenditures and more efficient investment. The analysis provided in this paper suggests that an increase in infrastructure expenditures from 5 to 6 percent of gross domestic product would raise the annual per capita growth rate of gross domestic product by about 0.5 percentage points in a decade's time and 1 percentage point by the third decade. If the increase in infrastructure investment did not imply a heavier government burden (for instance, by cutting down on inefficient expenditures), the corresponding increase in growth of per capita gross domestic product would be substantially larger, in fact twice as large by the end of the first decade. This highlights the importance of considering renewed infrastructure investment in the larger context of public sector reform.

The basic theoretical framework of the impact of public capital on economic growth was developed first by Arrow and Kurz (1970). Based on this framework, the endogenous growth literature shows that an increase in the stock of public capital can raise the steady state growth rate of output per capita, with permanent growth effects (Barro 1990, 1991, and Barro and Sala-I-Martin, 1992). Other studies focus on the differential impact of capital and current components of



public spending on growth (Devarajan et al., 1996), showing a positive effect from capital expenditures and often negative effects of current or consumption expenditures.

Calderon and Serven (2008) analyze the impact of infrastructure on economic performance of African countries. Using panel data for a large sample of countries for the period 1960-2005, they employ growth regressions estimated through a Generalized Method of Moments estimator and evaluate the impact of several types of infrastructure assets, as well as measures of quality of their services. Their findings suggest that both infrastructure stock and quality are positively and significantly related to real GDP per capita growth. In addition, the latter study evaluates the impact of a higher infrastructure development in African countries over the last 15 years (comparing 2001-05 to 1991-1995). At the country level, Egypt has attained the largest contribution of infrastructure development to growth (1.51%) among Northern African countries, with a rate higher than the average of the Africa region (0.99%).

Bivens, J., (2014) shows that the short- and long-term economic and employment impacts of infrastructure investment. It examines three possible scenarios for infrastructure investment and estimates their likely impact on overall economic activity, productivity, and the number and types of jobs, depending on how the investments are financed. The data show that by far the biggest near-term boost to gross domestic product and jobs comes from financing the new investment through new federal government debt rather than a progressive increase in taxation, a regressive increase in taxation, or cuts to government transfer programs. Our research also shows that this debt-financed impact is greater than that deriving from increases in infrastructure investment that are driven not by direct public investments but through other actions, such as regulatory mandates. The study reveals three types of Infrastructural investment scenario . Under scenario one, a debt-financed \$18 billion annual investment in infrastructure yields a \$29 billion increase in GDP and 216,000 net new jobs by the end of the first year, with the increased levels then sustained over the next decade. Under scenario two, a debt-financed package of green investments totaling \$92 billion annually boosts GDP by \$147 billion and generates 1.1 million net new jobs by the end of the first year, with the increased levels then sustained over the next decade. Under scenario three, a debt-financed \$250 billion annual investment boosts GDP by \$400 billion and overall employment by 3 million net new jobs by the end of the first year, with the increased levels then sustained over the seven-year life of the investment.

National Center for APEC published a report that it seeks to provide greater context and understanding of many of those factors, explaining in more depth why they are important and how economies can improve their infrastructure planning, implementation, and financing to better attract investment flows. The five factors identified are: (i) Augmenting government planning and implementation of infrastructure projects; (ii) Embracing financial market prerequisites for infrastructure finance; (iii) Developing robust Public-Private Partnerships (PPP), mechanisms and frameworks; (iv) Creating and maintaining a strong investment climate to attract Foreign Direct Investment (FDI); and (v) The future of infrastructure and technology.

Helm (2009) considers the role of infrastructure in improving economic performance, and its comparative neglect relative to traditional macroeconomic and macroeconomic policies. It explains why infrastructure matters, why Britain's infrastructure performance has been poor, and summarizes the scale of the challenge for the coming decade. Privatization, liberalization, and competition have focused on monopoly market failure and private incentives, but they have neglected the time inconsistency problem which confronts investors in networks with high fixed and sunk costs. The failure to commit which has characterized British approaches to infrastructure has been partially addressed through the creation of regulated asset bases (RABs), backed up by the duty on regulators to ensure that functions can be financed. The paper considers how the RABs can be developed to provide credible long-term contracts over a wide range of activities, and how the financial regulatory regime can complement this commitment, notably through the split cost of capital and the indexation of the cost of debt approaches. The paper concludes by setting out the building blocks of a credible regulatory framework for infrastructure, together with the impacts on reducing the cost of capital. The role of the State in reinforcing this commitment and the associated institutions is also set out.

Ahmed et al. (2013) stated the role of infrastructure in economic growth and welfare has been studied extensively across the literature over the past three decades. We use a dynamic CGE model linked to a micro simulation model to estimate the macro-micro impact of public infrastructure investment. Two approaches to public investment are considered in our simulations. In the first, production taxes finance the additional public infrastructure investment and in the second, foreign borrowing provides resources. Our results reveal that public infrastructure investments have the same direction of impact, whether funded by taxation or international borrowing, particularly when looking at macroeconomic gains and poverty reduction in the long run. However, in the very short run, tax

financing puts a strain on the output in the industrial sector and thus reduces economic growth in the short run. The financing from international borrowing has a Dutch disease-like impact in the short run, as indicated by a decline in exports.

The report of Infrastructure in the EU, confirms that there is a positive relationship between the growth of transport and electricity infrastructure and economic growth. Policies that promote spending in these areas have a positive impact on growth, provided they do not create excess capacity, as overprovision of infrastructure has been shown to create inefficiencies by diverting resources away from more productive investments.

Canning et al. (2014), investigate the long run consequences of infrastructure provision on per capita income in a panel of countries over the period 1950-1992. The approach is applied to explore an optimal level of infrastructure which maximizes the growth rate; if infrastructure levels are set too high they divert investment away from other capital to the point where income growth is reduced. Simple panel based tests are developed which enable us to isolate the sign and direction of the long run effect of infrastructure on income in a manner that is robust to the presence of unknown heterogeneous short run causal relationships. The results provide clear evidence that in the vast majority of cases infrastructure does encourage long run growth effects. But the study also finds a great deal of variation in the results across individual countries. Taken as a whole, the results demonstrate that telephones, electricity generating capacity and paved roads are provided as close to the growth, maximizing level on average, but are under-supplied in some countries and over-supplied by others. These results also help to explain why cross section and time series studies have in the past found contradictory results regarding a causal link between infrastructure provision and long run growth.

Warner (2014), looks at the empirical record, whether big infrastructure and public capital drives have succeeded in accelerating economic growth in low-income countries. It looks at big long-lasting drives in public capital spending, as these were arguably clear and exogenous policy decisions. On average the evidence shows only a weak positive association between investment spending and growth and only in the same year, as lagged impacts are not significant. Furthermore, there is little evidence of long term positive impacts. Some individual countries may be exceptions to this general result, as for example Ethiopia in recent years, as a high public investment has coincided with high GDP growth, but it is probably too early to draw ultimate conclusions.

Aschauer (1989) pioneered the research on the impact of the infrastructure investment on output and productivity growth. He found that relatively slower growth in the public capital accumulation in the United States during the 1970s and 80s was largely responsible for the private sector productivity slowdown. He found that the private output elasticity with respect to public capital was about 0.42 indicating a sizable level of sensitivity.

Following Aschauer (1989), Lynde and Richmond (1993) also investigated the causes for the decline in the US output and productivity growth since the early 1970s. They found that the services of the public capital are an important part of the production process and that about 40% of the productivity decline in the United States was explained by the fall in public capital-labour ratio. Furthermore, Ford and Poret (1991) suggest that cross-country differences in productivity growth might also be explained partly by differences in levels of infrastructure spending.

Aschauer (1993) argues further that the public infrastructure such as streets and highways, mass transit, water and sewer systems, and the like should be considered as a factor of production, along with labour and private capital, in the private sector production process. Therefore, to raise productivity growth countries must boost the rate of capital accumulation on the tangible capital such as plant and equipment, or intangible capital such as that generated by research and development expenditures.

Economic theory identifies five channels through which infrastructure can positively impact on economic growth: (i) Infrastructure may simply be regarded as a direct input into the production process and hence serve as a factor of production; (ii) infrastructure may be regarded as a complement to other inputs into the production process, in the sense that its improvements may lower the cost of production or its deficiency may create a number of costs for firms, (iii) infrastructure may stimulate factor accumulation through, for example, providing facilities for human capital development; (iv) infrastructure investment can also boost aggregate demand through increased expenditure during construction, and possibly during maintenance operations; and finally, (v) infrastructure investment can also serve as a tool to guide industrial policy; Government might attempt to activate this channel by investing in specific infrastructure projects with the intention of guiding private-sector investment decisions (Fedderke and Garlick, 2008).

Bhattacharyay, (2010) mention that properly designed infrastructure can also make growth more inclusive by sharing its benefits with poorer groups and communities, especially by connecting remote areas and small and landlocked

countries to major business centers. Inadequate infrastructure can hamper the potential economic growth of Asian countries, weaken their international competitiveness, and adversely affect their poverty reduction efforts. Regional infrastructure enhances competitiveness and productivity, which could help in the economic recovery and in sustaining growth in the medium to long-term. Regional infrastructure also helps increase the standard of living and reduce poverty by connecting isolated places and people with major economic centers and markets, narrowing the development gap among Asian economies. This paper estimates the need for infrastructure investment, including energy, transport, telecommunications, water, and sanitation during 2010-2020, in order to meet growing demands for services and facilitate further rapid growth in the region. By using “top-down” and “bottom-up” approaches, the paper provides a comprehensive estimate of Asia’s need for infrastructure services. The estimates show that developing countries in Asia require financing of US\$776 billion per year for national (US\$747 billion) and regional (US\$29 billion) infrastructure during 2010-2020 to meet growing demand.

Donaubauer, (2014), constructed comprehensive and comparable indices on the most relevant components of economic infrastructure. An unobserved components model is employed to cover the largest possible number of developing and developed countries over the period 1990-2010. They map major findings from the new indices of infrastructure and provide country rankings, which we also compare with subjective assessments of infrastructure in the World Economic Forum’s Global Competitiveness Report. Finally, they exemplify possible applications related to trade and FDI. By overcoming several data limitations, this new global index can help assess the links between infrastructure and economic development more systematically.

### **3. Objectives of the Study**

The objective of the study is embedded in the name of the article. The specific objectives of the study are:

- a. To explore the global infrastructural Scenario
- b. To explain the justification of the infrastructural investment for the long term

### **4. Methodology and Data**

The methodology used for this study is literature survey. Secondary data were collected through content analysis from various published sources, including

books, online journals, newspapers, magazines, government/ non-government organizations, super organizations like WB, OECD, previous works on the related issue and reports. The publication manual of APA (American Psychological Association, 2001) was used for citation of the sources of references that have been used in the study.

### **5. Defining long-term investment in infrastructure**

Infrastructure means those basic facilities and services which facilities different economic activities and thereby help in the economic development of the country, education, health, transport, and communication, banking and insurance, irrigation and power and science and technology etc. are the example of infrastructure. They are also called social overhead capital. These do not directly produce goods and services, but induce production in the agriculture industry and trade by generating external economies.

It is often argued that there is no universally accepted definition of infrastructure. One well-known attempt reads (Gramlich 1994): “The definition that makes the most sense from an economics standpoint consists of large capital intensive natural monopolies such as highways, other transport facilities, water and sewer lines, and communications” (in Wagenvoort et al. 2010). For a long time, the energy sector (coal and gas-fired power plants, wind power, etc.) was considered to be separate from infrastructure, understood as network utilities (water, road and gas networks).

Infrastructure and Economic Growth Infrastructure is a heterogenous term, including physical structures of various types used by many industries as inputs to the production of goods and service (Chan et al., 2009). This description encompasses “social infrastructure” (such as schools and hospitals) and “economic infrastructure” (such as network utilities). The latter includes energy, water, transport, and digital communications. They are the essential ingredients for the success of a modern economy and the focus of this paper (Stewart, 2010).

Finally, we define infrastructure investment as being invested in assets that provide sustainable services that are essential for a functioning economy. The services provided are typically monopolistic or quasi-monopolistic in nature as a result of geography or regulation. Demand for these services is often inelastic to price changes and these investments can therefore provide predictable and sustainable cash flows.

## 6. Types of Infrastructure

Infrastructure is a complex field with so many different components under it; but all of them can be categorized into two main types of infrastructures. They are the hard and the soft infrastructure. Each type will be briefly discussed below.

**Hard Infrastructure:** This refers to the physical network that keeps an industrialized nation smoothly functioning. Among the components that are classified under the hard infrastructure are the capital assets like the utilities, transport vehicles, telecommunication systems, roads, highways, railways, subways, traffic lights and street lights, dams, walls and culverts, drainage systems, the airports and bus terminals, and bridges, among others. For private infrastructure, these are the land, the buildings and other improvements, the electric posts and the water systems, the warehouses and storage facilities, and the vehicles, just to name a few. Hardware infrastructure is further classified into transportation, energy, communication, water management, measurement networks, and waste management.

**Soft Infrastructure:** The soft infrastructure, on the other hand, is the framework required to keep and maintain the different institutions. This can also include both the physical and the non-physical assets. Examples of physical assets are the buildings that house the network and the equipment used to maintain the institution. For non-physical assets, this includes the software and programs, the governing rules and regulations, the financial system, and the organizational structure. In essence, the soft infrastructure embodies the system of delivery of services to the people. If you want to create a corporate culture within the company then you must have a soft infrastructure for that specific culture for the workers to follow.

### **Broadly infrastructure can be divided in another two categories**

(i) **Economic Infrastructure:** Economic infrastructure means those basic facilities and services which directly benefit the process of production and distribution of an economy. Irrigation, power, transport and communication are the examples of economic infrastructure. It may be categorised as: (a) Irrigation and Power (b) Transport (c) Communication

(ii) **Social Infrastructure:** Social infrastructure means those basic activities and services which, in addition to achieving certain social objectives, indirectly help various economic activities. For example, education does not directly affect economic activities like production and distribution, but indirectly helps in the economic development of the country by producing

scientists, technologists and engineers. So education, health service, sanitation and water supply etc. are the examples of social infrastructure. It may be categorised as: (a) Education (b) Health, sanitation and water supply (c) Housing

## **7. Infrastructure and Public Goods**

Infrastructure is typically defined as a large investment that affects many aspects of the economy and exhibits substantial economies of scale. Costs decline as more people use the infrastructure and the value of the economic activity it supports expands. Given the size of the investment and the need to expand consumption over a long time horizon, it is difficult for private actors to realize an adequate return on such projects. It is highly unlikely that multiple suppliers will enter the field, so the probable outcome is a natural monopoly, at best a duopoly. Public goods are defined as goods that are non-rivalrous and non-excludable. By non-rivalrous, economists mean that consumption or use by one person does not exclude consumption or use by another person. Non-excludable means it is difficult to prevent people from using the good without paying for it. As a result, there is a tendency for people to free ride and for private actors to under invest. In other words, the private market under-supplies the public good, even though it is good for the public.

As an empirical matter, there are several clear linkages between infrastructure and public goods from the development economics point of view- First, infrastructure generates positive externalities by stimulating economic activity and public goods solve the problem of the inability to internalize externalities in private, market transactions. Second, as a practical matter, when infrastructure projects are first deployed and for a large part of their economic life, they tend to be uncongested and therefore non-rivalrous. This is particularly true in low density areas and at low levels of income. Third, infrastructure industries have generally been networks, connecting people and places. They have always exhibited network effects, where the value of the network grows as more people are connected to it. Information infrastructures in the digital age exhibit very strong network effects and all the positive externalities that result. Fourth, Infrastructure are important projects that society really needs, but they are not likely to be provided by private parties in adequate quantity or on terms of access that sustain the level of activity that is desirable.

## **8. The economic impact of Infrastructure**

Since Aschauer's seminal work (1989a) on the USA, there has been almost 25 years of academic research on the impact of infrastructure on growth. Understanding these long lasting debates is essential to have a balanced



quantitative view on the relevance of infrastructure for growth (Estache et al. 2012).

Debates on the proper econometric modeling have a tendency to dominate the disagreements among academics and other researchers on how much infrastructure matters. Part of the challenge, when interpreting this literature, is to make sure that the results are really comparable. A large number of empirical papers have tried to assess the impact of infrastructure on economic growth. The findings vary considerably, in terms of both the sign and magnitude of the impact. Many studies find a positive and important contribution of infrastructure provision to economic growth, but quite a few studies have found a weak or negligible impact (IE, 2014).

Two recent surveys show that public infrastructure has a positive effect on growth. Romp & de Haan (2007) conclude that "there is more consensus than in the past that public capital positively affects economic growth, but the impact seems to be lower than previously thought." Bom & Lighthart (2009) also point out that early estimates had the right (positive) sign but may have been too optimistic. Focusing on research on the output elasticity of public capital, they conduct a meta-analysis of all comparative studies and find it to average across studies at around 0.08—i.e. a 1% increase in the stock of public capital would lead to a 0.08% increase in GDP. Most of the research regarding the poverty and infrastructure can be translated into an assessment of the infrastructure investment requirements to achieve the growth needed to reach the reductions in poverty demanded by the MDGs (Estache et al. 2012). For well-planned and delivered public infrastructure projects, the World Economic Forum estimates that every dollar invested will generate an economic return of between 5 and 25 per cent (<https://g20.org/wp-content/uploads/2014/12/Infrastructure%20investment%20policy%20note.pdf>).

Economic theory identifies four channels through which infrastructure can have a positive impact on economic growth. First, energy and transport are used as inputs in firms' production function and hence influences their production cost, directly or indirectly, and ultimately their competitiveness from an international and national perspective (Pradhan and Bagchi, 2013). Second, investment in infrastructure may boost capital accumulation by providing opportunities for capital developments. Third, it can stimulate construction and maintenance operations (Wang, 2002; Esfahani & Ramirez, 2003; Phang, 2003; Short & Kopp, 2005; Pradhan, Bagchi, 2013). Finally, it may induce other investments by providing signals to key sectors in the economy (Fedderke and Garlick, 2008).

According to researchers at the overseas development institute (<http://www.odi.org/>), the lack of infrastructure in many developing countries represents one of the most significant limitations of economic growth and achievement of the millennium development goal (Kingombe, 2011). Infrastructure investments and maintenance can be very expensive, especially in, such as areas as landlocked, rural and sparsely populated countries in Africa (Kingombe, 2011). It has been argued that infrastructure investments contributed to more than half of Africa's improved growth performance between 1990 and 2005, and increased investment is necessary to maintain growth and tackle poverty. The returns to investment in infrastructure are very significant, with on average thirty to forty percent returns for telecommunication (ICT) investments, over forty percent of electricity generation, and eighty percent of the road. Conceptually, infrastructure may affect aggregate output in two main ways: (i) directly, considering the sector contribution to GDP formation and as an additional input in the production process of other sectors: and (ii) indirectly raising total factor productivity by reducing transaction and other costs thus allowing a more efficient use of conventional productive inputs. Infrastructure can be considered as a complementary factor for economic growth. The empirical is far from unanimous, but a majority of studies report a significant positive effect of infrastructure on output, productivity, or long-term growth rate. Infrastructure investment is complementary to other investment in the sense that insufficient infrastructure investment constrains other investment, while excessive infrastructure investment has no added value. To the extent that suboptimal infrastructure investment constrains other investment, it constrains growth (Newbery, 2012).

Empirical estimates of the magnitude of infrastructures contribution display considerable variation across studies. Overall, however, the most recent literature tends to find smaller (and more plausible) effects than those reported in the earlier studies (Aschauer, 1989, Calderon et al, 2011), likely as a result – at least in part – of improved methodology approaches that also allow better estimates of the relationship.

Infrastructure Development vs. Economic Development: Rob Mooren, Global Director, Infrastructure, ARCADIS prepared the 2nd Global infrastructure index in 2014, among the 41 countries. In his index, Singapore scored 1st and Venezuela scored 41st position. Among the 41 countries, 30 countries are high income countries but no LDC. In the position of the top16 countries, all are high income countries (see, Appendix-C). On the other hand, Donaubauer et al. (2014) constructed a new global Index of Infrastructure in 2014, among the 140

countries. In this index, top 34 countries, all are high income countries except China (28th position). In the 50 bottom countries, from 90 to 140, most of the countries belong to low income, very few countries belongs to upper income countries and among these 50 countries, there are no high income countries(see Appendix-D). This scenario gives us a clear picture that here is a positive relation between infrastructure investment and economic development.

### **9. Optimum Infrastructure Expenditure**

Key questions for project planning include the following: what is the optimum level of investment in infrastructure? Which projects should be given priority? How can appropriate projects be prepared?

It has not been easy to decide on the optimum level of infrastructure in a particular country at any given time. A rough rule of thumb is that total investment needs appear to be more than 7 per cent of gross domestic product (GDP) in low-income countries and about 3 per cent of GDP in upper middle-income countries (McCawley, 2010). Apart from noting these broad guidelines, however, it is probably not useful for policymakers to announce specific ‘top-down’ targets for investment levels in infrastructure. A better approach would be to approve only individual projects that meet rigorous investment criteria.

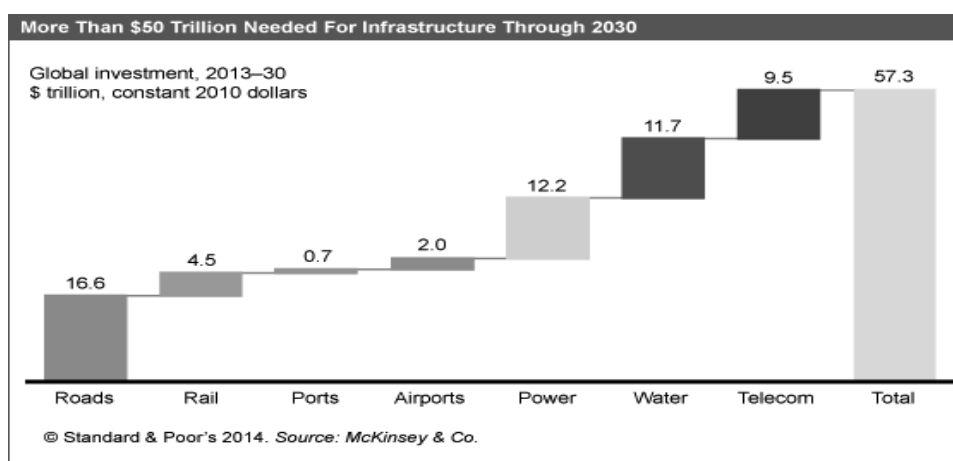
### **10. Required Infrastructural Investment**

Infrastructure is the engine of growth, especially, for the developing economies. Considering this idea, all the countries in the world are very much anxious for the future infrastructural investment. Over the last 18 years (before 2013) global infrastructure investment was 36 trillion USD (McKinsey Global Institute/McKinsey Infrastructure Practice, January, 2013). The demand for infrastructure, both by consumers and by companies is much higher than the amount invested (Kingombe, 2011). There are severe constraints on the supply side of the provision of infrastructure in Asia (McCawley, 2010).The organisation for Economic Co-operation and Development estimates that around \$40 trillion of investment in new and existing infrastructure will be required globally between now and 2030 (Source: OECD: Infrastructure to 2030, 2006-2007) and the World Bank estimates that an additional US\$1-1.5 trillion each year will be required through 2020 to meet growth targets in emerging and developing economies. But, due to the financial crisis, the World Bank indicates that in advanced economies, total investment from both public and private sources as a share of GDP is the lowest in 50 years in 2014. A major shift in infrastructure spending is under way.

Even before 2008, developing country spending had overtaken developed country spending on infrastructure, and the global financial crisis has accelerated this shift. While developed economies will continue to increase their spending on infrastructure, according to Oxford Economics their share of the global total will shrink from nearly half today to about one-third by 2025. (Source: <https://g20.org/wp-content/uploads/2014/12/Infrastructure%20investment%20policy%20note.pdf>)

According to a report from consultant McKinsey & Co., about \$57 trillion will be needed to finance infrastructure development around the world through 2030 (See Figure 1). Given the many budgetary constraints burdening governments globally, and with banks' long-term lending restricted by regulatory requirements, nontraditional lenders such as insurers and pension funds are poised to take a larger share of the infrastructure investment pie. From 2013 to 2030, that is, in the 16 years, total \$57 trillion or yearly \$3.5625 trillion is required for infrastructural investment. But if 3% of total Global GDP is spent for infrastructure, then total shortage is \$8.4 trillion, that is, yearly more than 500 \$billion. Institutional investors' allocations to infrastructure could rise to an average of 4%, potentially providing about \$200 billion per year in additional funding for the sector. If banks continue to lend to projects at current levels of about \$300 billion per year, these private sector inflows could fill the gap left by disappearing governments. Public policy decisions and investment incentives will play a big part in determining whether private sector institutions get more heavily involved.

Figure 1:



Source: Global Infrastructure: How To Fill A \$500 Billion Hole ([http://www.standardandpoors.com/spf/upload/Ratings\\_EMEA/HowToFillAn500BillionHoleJan162014.pdf](http://www.standardandpoors.com/spf/upload/Ratings_EMEA/HowToFillAn500BillionHoleJan162014.pdf))

### The Gap: Scenarios For Global Infrastructure Investment Needs Versus Public Sector Funding

Bhattacharyay, (2010) estimates that During the ten-year period of 2010-2020, the 32 ADB developing member countries covered in his paper are expected to need almost US\$8.22 trillion (in 2008 US\$) for infrastructure investment. This amounts to US\$747 billion in annual investment needed over 2010-2020. Around 68% of this is needed for new capacity investments in infrastructure and around 32% is needed for maintenance or replacement of existing assets. In general, the total projected infrastructure investment requirements are equal to about 6.5% of Asian estimated 2010-2020 GDP. Of the total investment, approximately 49% is estimated to be needed for energy infrastructure, 35% for transport, 13% for ITC, and 3% for water and sanitation. Among the countries included in the study, People's Republic of China (PRC), India, and Indonesia represent the top three countries in terms of the amount of infrastructure investment needed. Overall, the top 11 countries constitute 97% of Asia's total infrastructure investment needs, most of which are in Southeast Asia and South Asia.

Bhattacharyay, (2010) mentions that from 2010 to 2030, for maintaining the desired growth, Bangladesh needs 144,903 Billion USD and yearly 13,173 billion USD for infrastructural investment where 54% is for new capacity and 44% for maintenance.

*Table 1: National Infrastructure Investment Needs in Asia, 2010-2020:  
Per Sub-region and Per Sector (2008 US\$ billions)*

Sector / Subsector	East and Southeast Asia	South Asia	Central Asia	The Pacific	Total
<b>Electricity</b>	3,182.46	653.67	167.16	-	4,003.29
<b>Transportation</b>	1,593.87	1,196.12	104.48	4.41	2,898.87
Airports	57.73	5.07	1.41	0.10	64.31
Ports	215.20	36.08	5.38	-	256.65
Rails	16.14	12.78	6.03	0.00	34.95
Roads	1,304.80	1,142.20	91.65	4.31	2,542.97
<b>Telecommunications</b>	524.75	435.62	78.62	1.11	1,040.10
Telephones	142.91	6.46	4.45	0.05	153.87
Mobiles	339.05	415.87	71.97	0.95	827.84
Broadband	42.78	13.29	2.21	0.11	58.39
<b>Water and Sanitation</b>	171.25	85.09	23.40	0.51	280.24
Water	58.37	46.12	8.60	0.14	113.22
Sanitation	112.88	38.97	14.80	0.36	167.02
<b>Total</b>	5,472.33	2,370.50	373.66	6.02	8,222.50

Source: Bhattacharyay (2010), pp13

In Latin America, three percent of GDP (around US\$71 billion) would need to be invested in infrastructure in order to satisfy demand, yet in 2005, for example, only around two percent was invested leaving a financing gap of approximately US\$24 billion (Kingombe, 2011). In Africa, in order to reach the seven percent annual growth calculated to be required to meet the MDGs by 2015 would require infrastructure investments of about fifteen percent of GDP, or around US\$93 billion a year (Kingombe, 2011).

From the ADB and ADBI (2009) Study presented the quality of infrastructure in Asian and other developed economies. The quality of Asian economies is around the world average, but significantly lower the G7 countries. Among the 5 infrastructural sectors (like Rail, Road, Ports, Air and Electric) Rail, ports and electric quality is below quality than the world average. For maintaining G7 quality standards more investment in infrastructure is essential. As a result, The infrastructure financing gap between what is invested in Asia-Pacific (around US\$48 billion) and what is needed (US\$228 billion) is around US\$180 billion every year (Kingombe, 2011). Moreover, various studies have also shown that the quality and extensiveness of infrastructure networks greatly impact economic growth and reduce income inequalities and poverty (ADB/ADBI 2009).

### **11. Private Participation in Infrastructure to Fill-up the Gap**

Before the recent financial crisis, capital markets were a significant source of (project) debt financing. Before the recent financial crisis, capital markets were a significant source of (project) debt financing, made all the more attractive by monoline insurers' credit enhancements, especially in the UK and other European capital markets. Bank funding was abundant, with the provision of loans designer to each project, very long tenors and low margins. The dramatic weakening in the credit ratings of the monolines as a result of the crisis saw such funds disappear. The resulting increase in the cost of interbank lending and the expectation of tighter regulations, have constrained long-term debt funding by banks and also reduced the potential for loan syndication. It is already shown that, from 2013 to 2030, yearly shortage of infrastructural investment is more than 500 \$billion. Institutional investors' allocations to infrastructure could rise to an average of 4%, potentially providing about \$200 billion per year in additional funding for the sector. If banks continue to lend to projects at current levels of about \$300 billion per year, these private sector inflows could fill the gap left by disappearing governments. Public policy decisions and investment incentives will play a big part in determining whether private sector institutions get more heavily involved.

Table 2: Comparison of Asian infrastructure quality with the world, 2008

Region/country	Road	Rail	Ports	Air	Electric	Overall
Selected countries						
Country groupings						
World	3.8	3.0	4.0	4.7	4.6	3.8
G7	5.7	5.4	5.4	5.8	6.4	5.7
Asia	3.7	3.6	<b>3.9</b>	<b>4.6</b>	<b>4.1</b>	3.8
Asian regional averages						
East Asia	4.7	4.8	4.8	5.1	5.3	4.6
Southeast Asia	4.2	3.2	4.3	5.1	4.7	4.2
Central Asia	3.1	3.6	3.2	4.2	3.6	3.5
South Asia	3.1	2.8	3.4	4.2	2.8	2.9
Selected countries						
Singapore	6.6	5.6	6.8	6.9	6.7	6.7
Hong Kong	6.4	6.2	6.6	6.7	6.7	6.3
Malaysia	5.7	5.0	5.7	6.0	5.8	5.6
Korea	5.8	5.8	5.2	5.9	6.2	5.6
Taipei, China	5.6	5.7	5.5	5.7	5.9	5.5
Thailand	5.0	3.1	4.4	5.8	5.5	4.8
Brunei	5.1	n.a.	5.0	5.6	5.4	4.7
Darussalam						
China	4.1	4.1	4.3	4.4	4.7	3.9
Azerbaijan	3.7	4.0	4.2	5.2	3.9	3.9
Kazakhstan	2.5	3.6	3.2	3.7	4.3	3.5
Georgia	3.5	3.5	3.9	4.2	4.4	3.2
Tajikistan	2.6	3.3	1.6	3.5	1.7	3.2
Pakistan	3.5	3.0	3.7	4.2	2.5	3.1
Cambodia	3.1	1.6	3.4	4.2	4.2	3.1
India	2.9	4.4	3.3	4.7	3.2	2.9
Philippines	2.8	1.8	3.2	4.1	4.2	2.9
Indonesia	2.5	2.8	3.0	4.4	3.9	2.8
Viet Nam	2.6	2.4	2.8	3.9	3.2	2.7
<b>Bangladesh</b>	<b>2.8</b>	<b>2.3</b>	<b>2.6</b>	<b>3.4</b>	<b>1.9</b>	<b>2.2</b>
Nepal	1.9	1.3	2.9	3.5	1.7	1.9
Mongolia	1.4	2.1	2.4	2.7	2.9	1.7

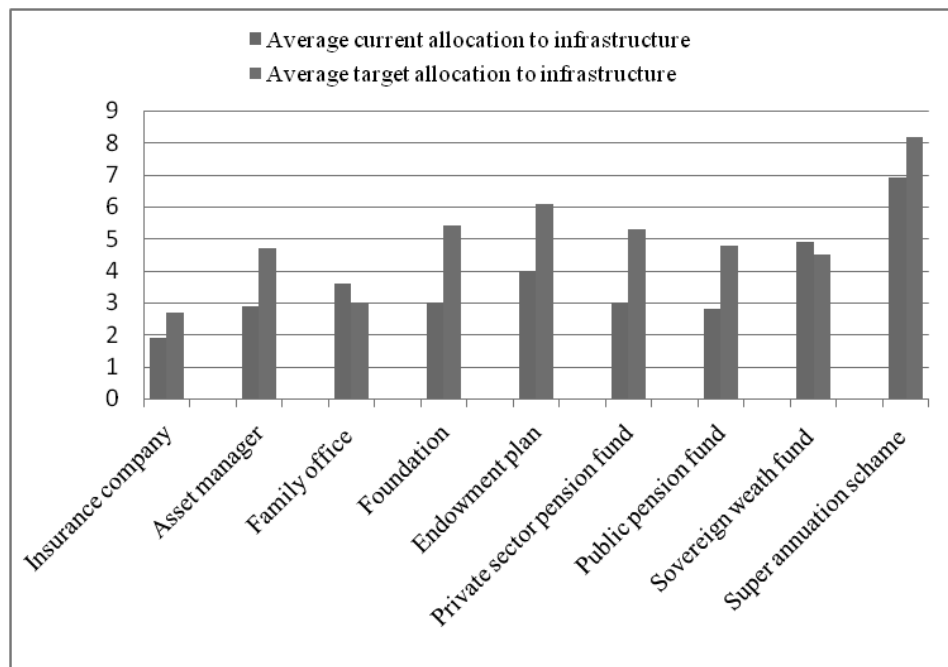
n.a. = not available.

Scores: 1 = underdeveloped; 7 = extensive and efficient by international standards.

Source: ADB and ADBI. 2009.

According to the statement of SPRS (2014), amid this opportunity for nontraditional lenders to take on a greater share of the investment, recent developments show that some have already begun to take up the responsibility. In the U.K., for example, six large insurers have said they will invest £25 billion (\$40.9 billion) in the British government's National Infrastructure Plan, which plans to pump £375 billion into energy, transportation, and waste and water projects in the next five years and beyond (SPRS, 2014). Institutional investors' allocations could rise to a weighted average of 4%, which could provide about \$200 billion per year in additional funding for the sector. Based on figures from the OECD and infrastructure data and research firm Prequin, as well as recent statements from institutions, Standard & Poor's<sup>1</sup> estimates that such investors are targeting an allocation of 3% to 8% of their assets under management over the next five years--a significant increase from what we've traditionally seen (see Figure 2 and 3). This could equate to as much as \$3.2 trillion in new money held in reserve for an asset class that is showing steady upward growth.

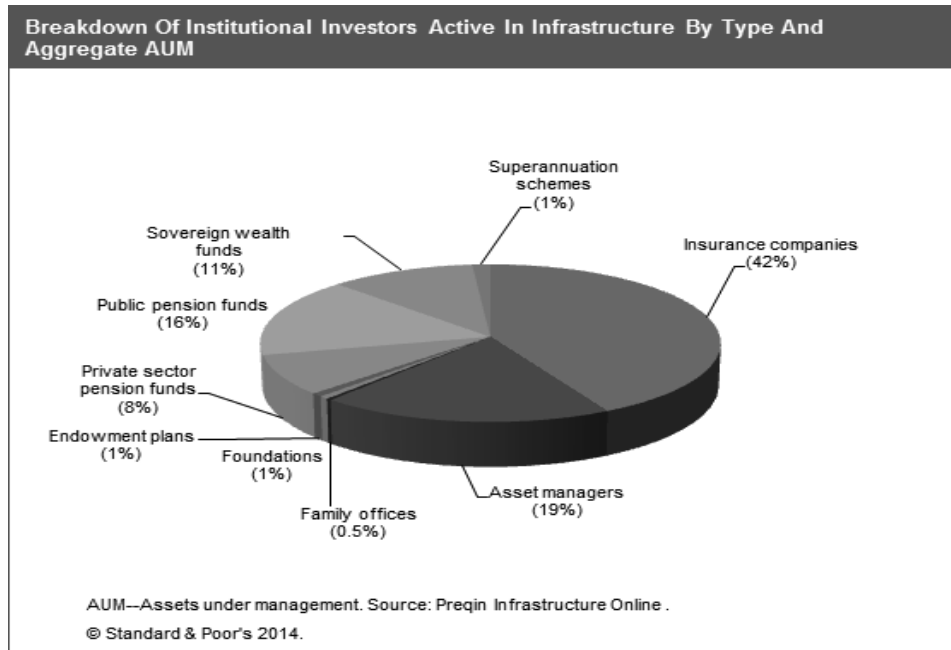
Figure 2:



Sources: cited as in SPRS, 2014



Figure 3:



Sources: cited as in SPRS, 2014

As it stands, the long-term global project finance market consists of a handful of banks and various capital markets players, including insurers, infrastructure fund managers, and investors in public bonds. Of these competing businesses, institutional investors have shown the biggest increase in the desire for such investments. A September 2013 Preqin2 survey showed that 58% of investors plan to increase their funding allocation for infrastructure in the long term. Almost two-thirds of respondents said they plan to allocate more capital to the sector in the next 12 months than in the previous year.

As it stands, the long-term global project finance market consists of a handful of banks and various capital markets players, including insurers, infrastructure fund managers, and investors in public bonds. Of these competing businesses, institutional investors have shown the biggest increase in hunger for such investments (see table 2). A September 2013 Preqin survey showed that 58% of investors plan to increase their funding allocation for infrastructure in the long term. Almost two-thirds of respondents said they plan to allocate more capital to the sector in the next 12 months than in the previous year.

## **12. Private Infrastructure Funding Strategy**

Infrastructure investments are typically relatively low-risk and low-volatility, with regular, long-term revenue streams that are often inflation-linked, and the industry is well regulated (Wehinger, 2011). These characteristics are particularly appealing in the current environment, which offers historically low yields for other fixed-income investments such as government bonds. Infrastructure funds are thus attractive investment vehicles for pension funds and other institutional investors, since they provide diversified portfolios of infrastructure businesses.

With the right policy framework, investors can make retirement savings systems more sustainable and foster long-term growth: A carefully designed policy framework should encourage institutional investors (many of which have to match their liabilities to long-term assets) to take advantage of long-term investments, such as infrastructure, which can provide inflation-linked and stable cash flows. The implementation of such a framework could generate a double benefit for governments: fostering the financial stability of retirement-savings systems (which would be relying more on “tangible” assets) and enabling the development of strategic infrastructure projects that contribute to long-term growth.

Capital markets and banks, once major sources of debt financing, are now constrained: Before the recent financial crisis, capital markets were a significant source of (project) debt financing, made all the more attractive by monoline insurers’ credit enhancements, especially in the UK and other European capital markets. Bank funding was abundant, with the provision of loans designer to each project, very long tenors and low margins. The dramatic weakening in the credit ratings of the monolines as a result of the crisis saw such funds disappear. The resulting increase in the cost of interbank lending and the expectation of tighter regulations, have constrained long-term debt funding by banks and also reduced the potential for loan syndication.

Targeted public measures can support private infrastructure financing: Some OECD countries have implemented targeted actions that have played a key positive role for infrastructure financing, such as the Transportation Infrastructure Finance and Innovation Act (TIFIA) and a tax exemption for private activity bonds (PAB) in the United States. In Europe, the European Investment Bank (EIB) has also supported infrastructure by allowing banks to adapt their lending capacity to longer maturities, and recently launching a consultation regarding an instrument directed at facilitating access to project bonds by institutional investors. These experiences show that targeted financial support of the public

sector can facilitate access to long-term debt for projects, matching long-term investors looking for stable cash flows with long-term assets such as infrastructure projects

Long-term policy planning, complemented by adequate regulation, is key to attracting private investors to infrastructure investments: Infrastructure investments require long-term policy planning. To be credible, strategic policy frameworks should exceed the duration of political cycles and be built on wide political consensus. Stable and accessible programmes for infrastructure projects and public-private partnerships (PPPs) are key in attracting private sector investors, complemented by adequate regulation.

### 13. Public Private Partnership Infrastructural Project IDA Countries

Public Private Partnership Infrastructural Project is becoming the very popular strategy for fulfilling the gap of supply and demand of the Infrastructure investment. Private investment in infrastructure in IDA3 countries from 2009 to 2014 totaled US\$73 billion. Over the same six-year period, 189 projects attained financial closure in four sectors: telecom, energy, transport, and water and sewerage. Of these projects, the vast majority of deals — 128 of 189 -- were in energy; telecom followed with 35; transport had 22; and water had four. Figure 4 Table 3 and Table 4 shows the status of infrastructural investment projects (number and amount) in IDA countries.

Figure 4: Numrer of Projects in IDA Countries, by Sector, 2009-2014

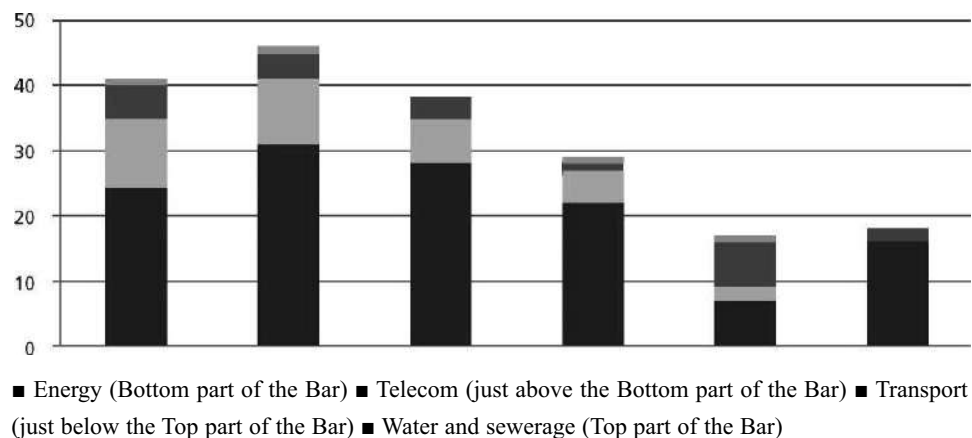


Table 3: Total PPI in IDA Countries from 2009 to 2014, by sector ( Million MSD)

	Energy	Telecom	Transport	Water & Sewerage	Grand Total
2009	\$1,362	\$10,500	\$914	\$1	\$12,777
2010	\$7,642	\$10,707	\$728	\$0	\$19,077
2011	\$2,275	\$8,419	\$1,254	\$0	\$11,948
2012	\$3,383	\$7,108	\$0	\$126	\$10,617
2013	\$1,924	\$4,598	\$5,796	\$0	\$12,319
2014	\$5,557	\$387	\$80	\$0	\$6,024
Grand Total	\$22,143	\$41,720	\$8,772	\$127	\$72,761

Source: World Bank and PPIAF, PPI Project Database

Table 4: Total Projects in IDA Countries from 2009 to 2014, by sector by Sector\*

	Energy	Telecom	Transport	Water & Sewerage	Grand Total
2009	24	11	5	1	41
2010	31	10	4	1	46
2011	28	7	3	0	38
2012	22	5	1	1	29
2013	7	2	7	1	17
2014	16	0	2	0	18
Grand Total	128	35	22	4	189

Source: World Bank and PPIAF, PPI Project Database

When comparing private investment in IDA countries to global PPI from 2009 to 2014, the difference is notable: investment in IDA countries was roughly 7% of total PPI, or just US\$73 billion of the US\$1 trillion in global commitments. The number of projects in IDA countries versus those in non-IDA countries is also comparably disproportionate: 189 in IDA versus 1,833 in non-IDA countries.

Among 77 IDA countries, Bangladesh is the most active country (Lao PDR is highest in with US\$7 billion in nine projects). Bangladesh had 42 projects (See Appendix-E)—the highest number and —the third highest of investment commitment. The Munshiganj Mawa Orion-Long King coal-fired plant was the

\* Table includes new projects only and does not include expansions to existing facilities. There were several such expansions recorded by the PPI Database in IDA countries between 2009 and 2014, including Henri Konan Bedie Bridge (Cote d'Ivoire), Vientiane Airport Terminal (Lao PDR), Port of Monrovia (Liberia), Maputo Port (Mozambique), and Apapa Container Terminal Concession (Nigeria).

largest deal at US\$579 million. Among them half of the all energy projects were rental power projects. Background is useful here. In 2007, Bangladesh sought to fix the country's power shortage problem, characterized by daily brownouts and blackouts. To narrow the gap between power supply and demand, the government tendered a package of six contracts for "quick rental power plants" (QRPPs), each offering temporary power at peak load times. By 2010 it became official: the government's Power System Master Plan noted that QRPPs would be the main tool to reduce power shortages in the country. Under the plan, QRPPs were commissioned to add 1,000MW of power. But since rented plants are relatively inefficient and costly, they were meant to be a short-term solution until the country added greater capacity to the existing grid.

#### 14. A Snapshot of Private Participation in Infrastructure in Bangladesh, South Asia and East Asia and Pacific

##### A. Private Participation in Infrastructure in Bangladesh from 1990 - 2014

Table 5: Highlights (1990 - 2014)

Infrastructure Sectors Reported	Airports, Electricity, Natural Gas, Roads, Seaports, Telecom
Projects reaching financial closure	65
Total investment	10,941
Sector with largest investment share	Telecom
Type of PPI with largest share in investment	Greenfield project
Projects cancelled or under distress	4 representing 1% of total investment

Source: <http://ppi.worldbank.org/data>, Retrieved at: 12.08.15

Table 6: Top Projects in Bangladesh

Project	Investment (USD million)
GrameenPhone	2,688
Banglalink	1,774
TM International (Bangladesh) Ltd.	1,063
Warid Telecom Bangladesh	805
Munshiganj Mawa Orion-Long King coal-fired plant	579
Haripur Marubeni combined cycle plan	370
Pacific Bangladesh Telecom Limited	329
Summit Meghnaghat Power Company Limited	320
Meghnaghat Gas-Fired Power Plant	314
Peoples Telecommunication and Information Services Ltd	301

Source: <http://ppi.worldbank.org/data>, Retrieved at: 12.08.15

Table 7: Top Sponsors in Bangladesh

Sponsor	Country of Origin	Investment (USD million)	No.of projects
Telenor	Norway	2,688	16
Orascom	Egypt, Arab Rep.	1,774	13
NTT DOCOMO	Japan	1,063	12
Axiata Group Berhad	Malaysia	1,063	12
Summit Industrial and Mercantile Corp.	Bangladesh	893	8
Abu Dhabi Group	United Arab Emirates	805	8
Bharti Enterprises	India	805	8
Orion Group	Bangladesh	705	3
General Electric	United States	620	2
Al Jomaih Holding Co.	Saudi Arabia	598	3

Source: <http://ppi.worldbank.org/data>, Retrieved at: 12.08.15

Table 8: Sectoral Project in Bangladesh

Sub-sector	Project Count	Total Investment(USD million)
Airports	1	0
Electricity	47	3,905
Natural Gas	1	31
Roads	2	0
Seaports	2	0
Telecom	12	7,005

Source: <http://ppi.worldbank.org/data>, Retrieved at: 12.08.15

Table 9: Cancelled or Distressed in Bangladesh

Sub-sector	Project Count	Total Investment (USD million)	% of Total Invement
Airports	1	0	0%
Telecom	3	163	1%

Source: <http://ppi.worldbank.org/data>, Retrived at: 12.08.15

**B. Private Participation in Infrastructure in South Asia from 1990 - 2014***Table 10: Highlights (1990 - 2014)*

Infrastructure Sectors Reported	Airports, Electricity, Natural Gas, Roads, Seaports, Telecom
Projects reaching financial closure	8
Projects reaching financial closure	1,103 with total investment of \$ 387,081
Sector with largest investment share	Electricity(42%)
Type of PPI with the largest share of investment	Greenfield project(76%)
Type of PPI with largest share in projects	Greenfield project(63%)
Projects cancelled or under distress	40 representing 5% of total investment

Source: <http://ppi.worldbank.org/data>, Retrived at: 12.08.15

*Table 11: Sectoral Project and Investment of Private Participation in Infrastructure in South Asia from 1990 – 2014*

Sub-sector	Project Count	Total Investment (USD million)
Airports	10	5,629
Electricity	551	161,879
Natural Gas	8	1,076
Railroads	8	7,826
Roads	384	72,878
Seaports	50	11,891
Telecom	77	126,090
Water and sewerage	15	605

Source: <http://ppi.worldbank.org/data>, Retrived at: 12.08.15

**C. Private Participation in Infrastructure in East Asia and Pacific from 1990 - 2014***Table 12: Highlights (1990 - 2014)*

Infrastructure Sectors Reported	Airports, Electricity, Natural Gas, Roads, Seaports, Telecom
Projects reaching financial closure	8
Projects reaching financial closure	1,103 with total investment of \$ 387,081
Sector with largest investment share	Electricity(42%)
Type of PPI with the largest share in investment	Greenfield project(76%)
Type of PPI with largest share in projects	Greenfield project(63%)
Projects cancelled or under distress	40 representing 5% of total investment

Source : Retrived at : 12.08.15

*Table 13: Sectoral Project and Investment of Private Participation in Infrastructure in East Asia and Pacific from 1990 – 2014*

Subsector	Project Count	Total Investment(USD million)
Airports	28	4,536
Electricity	683	153,317
Natural Gas	208	9,734
Railroads	28	22,882
Roads	209	43,707
Seaports	120	21,468
Telecom	81	112,524
Water and sewerage	488	31,232

Source: <http://ppi.worldbank.org/data>, Retrieved at: 12.08.15

## 15. Conclusion

As infrastructure is public goods in nature, as well as large volume of financing is involved and return of capital is comparatively low and slow (though reliable), market mechanism does not function efficiently. For this reason, national and international organizations should take special types of policies and regulations for supplying the efficient level of infrastructural investment. There is a growth, maximizing level of infrastructure above which the diversion of resources from other productive uses is greater than the gain from having more infrastructure. Below this level, increases in infrastructure provision increase long run income, while above this level an increase in infrastructure reduces long run income. Investment in infrastructure follows the economic rule of diminishing returns to scale. There is a clear division in the context of required amount of infrastructural investment between developed and undeveloped or developing or less developing countries. So, Global growth is certainly sub-optimal. For achieving the optimal global growth (bliss point), incremental rate of the infrastructural investment in less developed countries should be larger than that of the developed countries.



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Notes:

*1Standard and Poor's Rating Service, McGROHILL FINANCESERVICE,*

*With 26 offices around the world and a history that dates back more than 150 years, Standard & Poor's Ratings Services provides high-quality market intelligence in the form of credit ratings, research, and thought leadership.*

*2Preqin is the alternative assets industry's leading source of data and intelligence. Our products and services are utilized by more than 24,000 professionals located in over 94 countries for a range of activities including investor relations, fundraising and marketing, and market research.*

*Preqin, founded in 2003, operates from offices in New York, London, Singapore and San Francisco. We are an independent business owned by our directors and employees.*

*3IDA-The International Development Association (IDA) is the part of the World Bank that helps the world's poorest countries. Established in 1960, IDA aims to reduce poverty by providing loans (called "credits") and grants for programs that boost economic growth, reduce inequalities, and improve people's living conditions.*

Appendix A: Table of National Infrastructure Investment Needs in Asia: 2010-2020

Country / Sub region	% of Total Asian Investment Need	Estimated Investment Needs (US\$ millions)	Investments as Percentage of Total		Total Investment per Year	Total Investment per Capita (US\$)	2008 GDP Per Capita (Constant 2000 US\$)
			New Capacity	Maintenance			
<b>Central Asia</b>	<b>4.544%</b>	<b>373,657</b>	<b>54%</b>	<b>46%</b>	33,969	1,403	<b>753</b>
Afghanistan	0.318%	26,142	57%	43%	2,377	901	-
Armenia	0.051%	4,179	41%	59%	380	1,358	1,520
Azerbaijan	0.344%	28,317	64%	36%	2,574	3,262	2,131
Georgia	0.060%	4,901	24%	76%	446	1,138	1,268
Kazakhstan	0.846%	69,538	61%	39%	6,322	4,436	2,378
Kyrgyz Rep.	0.107%	8,789	38%	62%	799	1,665	376
Pakistan	2.172%	178,558	53%	47%	16,233	1,075	650
Tajikistan	0.139%	11,468	47%	53%	1,043	1,678	245
Uzbekistan	0.508%	41,764	48%	52%	3,797	1,529	840
<b>East and Southeast Asia</b>	<b>66.553%</b>	<b>5,472,327</b>	<b>71%</b>	<b>29%</b>	<b>497,484</b>	<b>2,886</b>	<b>1,765</b>
Cambodia	0.163%	13,364	51%	49%	1,215	918	511
PRC	53.118%	4,367,642	72%	28%	397,058	3,297	1,965
Indonesia	5.476%	450,304	70%	30%	40,937	1,981	1,087
Lao PDR	0.138%	11,375	56%	44%	1,034	1,833	475
Malaysia	2.287%	188,084	79%	21%	17,099	6,962	5,151
Mongolia	0.122%	10,069	37%	63%	915	3,812	735
Myanmar	0.264%	21,698	56%	44%	1,973	438	-
Philippines	1.546%	127,122	53%	47%	11,557	1,407	1,225
Thailand	2.103%	172,907	72%	28%	15,719	2,566	2,640
Viet Nam	1.335%	109,761	53%	47%	9,978	1,273	647
<b>South Asia</b>	<b>28.829%</b>	<b>2,370,497</b>	<b>63%</b>	<b>37%</b>	<b>215,500</b>	<b>1,756</b>	<b>685</b>
<b>Bangladesh</b>	<b>1.762%</b>	<b>144,903</b>	<b>54%</b>	<b>46%</b>	<b>13,173</b>	<b>906</b>	<b>462</b>
Bhutan	0.011%	886	30%	70%	81	1,291	1,247
India	26.421%	2,172,469	64%	36%	197,497	1,906	718
Nepal	0.174%	14,330	50%	50%	1,303	497	254
Sri Lanka	0.461%	37,908	52%	48%	3,446	1,881	1,199
<b>The Pacific</b>	<b>0.073%</b>	<b>6,023</b>	<b>30%</b>	<b>70%</b>	<b>548</b>	<b>625</b>	<b>840</b>
Fiji	0.008%	667	15%	85%	61	790	2,181
Kiribati	0.001%	82	10%	90%	7	846	826
PNG	0.051%	4,214	34%	66%	383	641	676
Samoa	0.003%	242	13%	87%	22	1,351	1,739
Solomon Is.	0.004%	336	33%	67%	31	657	1,136
Timor-Leste	0.001%	71	35%	65%	6	65	329
Tonga	0.001%	106	13%	87%	10	1,022	1,666
Vanuatu	0.004%	306	40%	60%	28	1,309	1,339
<b>Total Asia</b>	<b>100%</b>	<b>8,222,503</b>	<b>68%</b>	<b>32%</b>	<b>747,500</b>	<b>2,335</b>	<b>1,272</b>

Source: Bhattacharya (2010), pp 12

*Appendix B: Infrastructure Investment Needs as a % of Estimated GDP 2010-2020*

Country	Investment as % of Estimated GDP				
	Transport	Electricity	ITC	Water and Sanitation	Total
<b>Central Asia</b>	<b>1.86%</b>	<b>2.97%</b>	<b>1.40%</b>	<b>0.42%</b>	<b>6.64%</b>
Afghanistan	6.21%	0.00%	4.82%	0.89%	11.92%
Armenia	1.20%	1.01%	0.98%	0.27%	3.46%
Azerbaijan	0.60%	3.82%	0.44%	0.11%	4.97%
Georgia	1.20%	1.06%	0.69%	0.19%	3.14%
Kazakhstan	0.58%	2.92%	0.20%	0.07%	3.77%
Kyrgyz Rep.	3.94%	6.24%	2.44%	0.67%	13.29%
Pakistan	2.65%	2.68%	2.22%	0.73%	8.27%
Tajikistan	3.30%	9.83%	2.57%	0.51%	16.21%
Uzbekistan	2.65%	4.65%	1.94%	0.58%	9.82%
<b>East and Southeast Asia</b>	<b>1.61%</b>	<b>3.22%</b>	<b>0.53%</b>	<b>0.17%</b>	<b>5.54%</b>
Cambodia	4.43%	0.95%	2.97%	0.36%	8.71%
PRC	1.39%	3.42%	0.44%	0.13%	5.39%
Indonesia	3.88%	0.98%	0.97%	0.35%	6.18%
Lao PDR	10.62%	0.00%	2.40%	0.60%	13.61%
Malaysia	1.94%	4.42%	0.27%	0.04%	6.68%
Mongolia	12.04%	0.00%	1.21%	0.21%	13.45%
Myanmar	2.70%	0.00%	1.46%	1.88%	6.04%
Philippines	2.30%	1.87%	1.22%	0.65%	6.04%
Thailand	0.58%	3.69%	0.45%	0.19%	4.91%
Viet Nam	2.07%	3.12%	2.38%	0.54%	8.12%
<b>South Asia</b>	<b>5.55%</b>	<b>3.03%</b>	<b>2.02%</b>	<b>0.39%</b>	<b>11.00%</b>
Bangladesh	4.92%	1.24%	4.22%	1.19%	11.56%
Bhutan	2.84%	0.00%	0.87%	0.36%	4.07%
India	5.67%	3.23%	1.87%	0.34%	11.12%
Nepal	1.65%	0.58%	5.14%	1.10%	8.48%
Sri Lanka	4.23%	1.00%	1.39%	0.22%	6.85%
<b>The Pacific</b>	<b>2.60%</b>	<b>0.00%</b>	<b>0.65%</b>	<b>0.30%</b>	<b>3.55%</b>
Fiji	1.01%	0.00%	0.53%	0.14%	1.68%
Kiribati	5.17%	0.00%	0.16%	0.32%	5.65%
PNG	3.30%	0.00%	0.73%	0.32%	4.35%
Samoa	3.33%	0.00%	1.12%	0.26%	4.70%
Solomon Is.	3.50%	0.00%	0.28%	0.35%	4.13%
Timor-Leste	0.00%	0.00%	0.07%	0.79%	0.86%
Tonga	2.29%	0.00%	1.13%	0.29%	3.71%
Vanuatu	2.92%	0.00%	0.92%	0.28%	4.13%
<b>Total Asia</b>	<b>2.30%</b>	<b>3.17%</b>	<b>0.82%</b>	<b>0.22%</b>	<b>6.52%</b>

Source: Bhattacharya (2010), pp14

*Appendix C: Table of The Second Global Infrastructure  
Investment Index ranks Results, 2014*

Country	Overall Rank 14	Country	Overall Rank 14
Singapore	1	South Africa	22
Qatar	2	Indonesia	23
UAE 4	3	Spain	24
Canada	4	India	25
Sweden	5	Mexico	26
Norway	6	Colombia	27
Malaysia	7	Turkey	28
USA	8	Philippines	29
Australia	9	Poland	30
UK	10	Portugal	31
Netherlands	11	Brazil	32
Saudi Arabia	12	Egypt	33
Chile	13	Russia	34
Germany	14	Italy	35
Japan	15	Romania	36
Austria	16	Pakistan	37
China	17	Nigeria	38
Belgium	18	Argentina	39
France	19	Greece	40
Thailand	20	Venezuela	41
Korea (Rep of)	21		

*Source: The Second Global Infrastructure Investment Index ranks, 2014*



*Appendix D: Table of A New Global Index of Infrastructure Country Ranking;  
Overall infrastructure and sub-categories*

Country	Income Level	Total (Rank)	Index Value	Transport	Energy	ICT	Finance	2010	2000	1990
Hong Kong	High	1	(-3.216)	1	2	42	1	1	11	18
Singapore	High	2	(-2.673)	2	9	16	2	2	3	4
Germany	High	3	(-2.519)	4	1	21	18	3	6	14
United States	High	4	(-2.399)	3	19	7	10	4	2	1
Switzerland	High	5	(-2.015)	8	4	18	13	5	4	7
Canada	High	6	(-2.012)	18	14	3	15	6	12	6
Norway	High	7	(-1.924)	23	18	1	36	7	1	2
Luxembourg	High	8	(-1.872)	5	3	8	55	8	7	17
Japan	High	9	(-1.861)	10	15	14	11	9	5	3
United Kingdom	High	10	(-1.85)	9	8	32	8	10	10	8
Austria	High	11	(-1.715)	7	11	17	31	11	14	16
France	High	12	(-1.695)	12	6	19	22	12	15	12
Korea, Rep.	High	13	(-1.685)	25	5	11	12	13	18	21
Sweden	High	14	(-1.573)	31	10	6	27	14	8	5
Finland	High	15	(-1.461)	32	26	4	28	15	16	10
Australia	High	16	(-1.457)	44	17	10	9	16	21	9
Belgium	High	17	(-1.441)	15	12	15	35	17	17	27
Netherlands	High	18	(-1.39)	24	13	23	17	18	9	11
Israel	High	19	(-1.302)	40	22	20	6	19	24	19
Spain	High	20	(-1.271)	30	25	33	4	20	22	25
New Zealand	High	21	(-1.249)	41	16	13	19	21	20	15
Kuwait	High	22	(-1.248)	50	42	2	20	22	28	29
Denmark	High	23	(-1.187)	22	7	27	38	23	13	13
Italy	High	24	(-1.168)	14	31	36	24	24	19	23
Ireland	High	25	(-1.102)	13	23	30	51	25	26	26
Qatar	High	26	(-1.094)	37	24	5	56	26	27	24
United Arab Emirates	High	27	(-1.06)	28	29	9	44	27	31	20
China	Upper	28	(-0.943)	17	71	47	5	28	35	58
Czech Rep.	High	29	(-0.852)	16	30	25	68			
Slovenia	High	30	(-0.794)	19	20	26	88	29	30	33
Portugal	High	31	(-0.767)	36	37	38	23	30	25	48
Cyprus	High	32	(-0.707)	35	35	34	37	31	23	28
Bahrain	High	33	(-0.686)	27	50	12	54	32	34	31

Country	Income Level	Total (Rank)	Index Value	Transport	Energy	ICT	Finance	2010	2000	1990
Croatia	High	34	(-0.652)	42	28	58	25	33	41	44
India	Lower	35	(-0.579)	6	117	109	16	34	37	52
Greece	High	36	(-0.547)	43	21	35	58	35	29	37
Ukraine	Lower	37	(-0.485)	11	65	51	64	36	53	22
Malaysia	Upper	38	(-0.485)	72	76	41	7	37	33	42
Belarus	Upper	39	(-0.467)	21	34	52	71	38	40	30
Saudi Arabia	High	40	(-0.447)	102	41	22	34	39	51	47
Lebanon	Upper	41	(-0.447)	54	63	55	14			
Estonia	High	42	(-0.443)	104	27	24	53	40	36	34
Jordan	Upper	43	(-0.415)	45	83	71	3	41	48	39
Poland	High	44	(-0.351)	29	43	45	66	42	38	41
Russian	High	45	(-0.325)	38	32	29	96	43	55	32
Panama	Upper	46	(-0.321)	26	55	79	42	44	42	56
Slovak Rep.	High	47	(-0.244)	34	39	31	102	45	32	38
Bulgaria	Upper	48	(-0.223)	46	33	40	82	46	45	36
Oman	High	49	(-0.108)	71	44	44	60	47	57	61
Latvia	High	50	(-0.078)	20	38	57	120	48	47	40
Trinidad and Tobago	High	51	(-0.071)	47	49	28	95	49	54	53
Bosnia and Herzegovina	Upper	52	(-0.029)	92	54	48	46			
South Africa	Upper	53	(-0.029)	76	89	43	30	50	43	55
Serbia	Upper	54	(-0.023)	86	51	53	49			
Egypt, Arab Rep.	Lower	55	(-0.020)	48	78	68	33	51	50	73
Chile	High	56	(-0.002)	126	56	49	29	52	58	76
Mauritius	Upper	57	(-0.015)	87	60		45	53	39	46
Thailand	Upper	58	(-0.033)	112	86	54	21	54	44	51
Guyana	Lower	59	(-0.056)	89	46		62			
Vietnam	Lower	60	(-0.062)	94	72	77	32			
Libya	Upper	61	(-0.065)	53	74	46				
Turkey	Upper	62	(-0.068)	90	68	69	39	55	62	90
Morocco	Lower	63	(-0.152)	121	67	88	26	56	56	93
Suriname	Upper	64	(-0.161)	66	66		72			
Brazil	Upper	65	(-0.203)	128	48	78	41	57	63	91
Iran, Islamic	Upper	66	(-0.243)	73	69	65	63	58	78	64
Hungary	Upper	67	(-0.254)	93	40	50	110	59	46	49

Country	Income Level	Total (Rank)	Index Value	Transport	Energy	ICT	Finance	2010	2000	1990
Tunisia	Upper	68	(-0.278)	85	87	76	40	60	60	89
Moldova	Lower	69	(-0.281)	70	57	107	59			
Bhutan	Lower	70	(-0.317)	88	96		47			
Uruguay	High	71	(-0.366)	78	45	56	116	61	68	62
Lithuania	High	72	(-0.375)	84	36	91	113	62	52	35
Fiji	Upper	73	(-0.385)	39	85		107			
Mongolia	Lower	74	(-0.414)	80	112	74	43	63	83	57
Honduras	Lower	75	(-0.417)		91	116	48	64	65	63
Uzbekistan	Lower	76	(-0.419)	79	95	63				
Kazakhstan	Upper	77	(-0.440)	33	93	39	124			
Armenia	Lower	78	(-0.449)	96		70	89	65	71	45
Cuba	Upper	79	(-0.454)	58	98	93		66	72	59
Guatemala	Lower	80	(-0.466)	63	90	83	69	67	74	66
Venezuela, RB	Upper	81	(-0.470)	52	47	72	127	68	76	74
Albania	Upper	82	(-0.470)	122	58	73	70	69	91	88
Turkmenistan	Upper	83	(-0.490)	81	108	61				
Costa Rica	Upper	84	(-0.505)	119	62	64	87	70	59	60
Mexico	Upper	85	(-0.515)	116	61	82	81	71	70	75
Romania	Upper	86	(-0.518)	108	59	59	106	72	49	54
Swaziland	Lower	87	(-0.521)	75	88		94	73	95	81
Macedonia, FYR	Lower	88	(-0.555)	120	52	67	103	74	61	50
Syrian Arab Rep.	Lower	89	(-0.559)	111	70	81	85	75	82	70
Philippines	Lower	90	(-0.567)	105	92	86	57	76	64	94
Tajikistan	Low	91	(-0.606)	99	105	84				
Ethiopia	Low	92	(-0.617)	61	130	92		77	85	79
Sri Lanka	Lower	93	(-0.622)	113	82	97	67	78	86	97
Dominican Rep.	Upper	94	(-0.626)		80	122	78	79	66	68
Ecuador	Upper	95	(-0.637)	55	64	98	123	80	98	77
Colombia	Upper	96	(-0.681)	107	73	96	101	81	89	95
Jamaica	Upper	97	(-0.693)	69	79	105	108	82	67	72
Lao PDR	Lower	98	(-0.709)	65	120		109			
Tanzania	Low	99	(-0.721)	67	124	112	61	83	101	83
Burkina Faso	Low	100	(-0.723)	68	132		100			
Paraguay	Lower	101	(-0.731)	131	94	37	90			
Indonesia	Lower	102	(-0.738)	106	106	80	74	84	77	85

Country	Income Level	Total (Rank)	Index Value	Transport	Energy	ICT	Finance	2010	2000	1990
Algeria	Upper	103		91	97	104	75	85	75	67
Argentina	Upper	105	(-0.765)	100	53	60	132	86	80	100
Gambia, The	Low	106	(-0.768)	109	111		99			
Mauritania	Lower	107	(-0.772)	125	119		65			
Congo, Dem. Rep.	Low	108	(-0.798)	95	136	94				
Guinea	Low	109	(-0.811)	49	134		112			
Zimbabwe	Low	110	(-0.816)		138	62	97	87	93	102
<b>Bangladesh</b>	<b>Low (Now lower middle)</b>	<b>111</b>	<b>(-0.823)</b>	<b>127</b>	<b>113</b>	<b>90</b>	<b>52</b>			
Georgia	Lower	112	(-0.839)	74	84	66	130	88	73	43
Azerbaijan	Upper	113	(-0.840)	118	77	100	105			
Senegal	Lower	114	(-0.847)	123	107	114	50	89	84	82
Kenya	Low	115	(-0.848)	117	100	103	73	90	103	99
Pakistan	Lower	116	(-0.851)	83	116	102	84	91	69	96
El Salvador	Lower	117	(-0.893)	82	81	89	128	92	90	71
Sudan	Lower	118	(-0.895)	64	123	117	93	93	92	80
Yemen, Rep.	Lower	119	(-0.940)	62	114	118	104	94	79	65
Cambodia	Low	120	(-0.941)	57	129	121	80			
Nigeria	Lower	121	(-0.955)	60	104	108	118	95	100	103
Nicaragua	Lower	122	(-0.976)	110	110	119	76			
Papua New Guinea	Lower	123	(-0.980)	56	133		129			
Peru	Upper	124	(-1.009)	129	75	75	122	96	81	98
Mozambique	Low	125	(-1.011)	103	131	99	92	97	88	78
Madagascar	Low	126	(-1.045)	115	135		111			
Myanmar	Low	127	(-1.049)	124	137	106		98	97	92
Zambia	Lower	128	(-1.051)		125	115	119	99	94	69
Cote D'Ivoire	Lower	129	(-1.068)	51	122	113	121	100	99	101
Ghana	Lower	130	(-1.069)		99	110	131	101	102	86
Cameroon	Lower	131	(-1.077)	130	128	87	77			
Gabon	Upper	132	(-1.078)	101	109	101	115			
Iraq	Upper	133	(-1.086)	97	115	123	79			
Nepal	Low	134	(-1.160)		126	124	114	102	87	84

Country	Income Level	Total (Rank)	Index Value	Transport	Energy	ICT	Finance	2010	2000	1990
Botswana	Upper	135	(-1.206)	77	101	125	91			
Haiti	Low	136	(-1.243)		127	126	83			
Kyrgyz Rep.	Low	137	(-1.265)	98	139	111	98			
Namibia	Upper	138	(-1.282)	114	102	120	125			
Bolivia	Lower	139	(-1.347)	132	103	85	126			
Congo, Rep.	Lower	140	(-1.435)		118	127	117	103	96	87

*Source: Donaubauer, J, Mayer B., Nunnenkamp, P., (2014),*

*Appendix E: PPP Projects List of Bangladesh in Infrastructure Sector*

The list of CCEA/LM approved projects under the Public Private Partnership Programme:

<b>SL</b>	<b>Sector</b>	<b>Project Name</b>	<b>Status</b>
1.	Transport	Dhaka-Elevated Expressway.	Award Stage - Preparatory Activities
2.	Health	Hemodialysis Centre at Chittagong Medical College Hospital.	Award Stage - Preparatory Activities
3.	Health	Hemodialysis Centre at National Institute of Kidney Diseases and Urology (NIKDU).	Award Stage - Preparatory Activities
4.	Zone	Hi-tech Park at Kaliakoir.	Award Stage - Letter of Award
5.	Transport	2 Jetties at Mongla Port through PPP.	Procurement Stage - Negotiation
6.	Zone	Economic Zone 4: Mongla.	Procurement Stage - Proposal Evaluation
7.	Zone	IT Village at Mohakhali.	Procurement Stage - RFP
8.	Tourism	Development of Integrated Tourism & Entertainment Village at Cox's Bazar.	Procurement Stage - RFQ
9.	Transport	Supply, Installation and Commissioning of a Multi Mode Surveillance System (Radar, etc. at Hazrat Shahjalal International Airport, Dhaka).	Procurement Stage - ROI
10.	Health	Oboshor: Senior Citizen Health Care and Hospitality Complex at Sreemangal, Sylhet Division.	Procurement Stage - IFT
11.	Transport	Upgrading of Dhaka Bypass to 4 Lane (Madanpur-Debogam-Bhulta-Joydebpur).	Procurement Stage - ROI
12.	Civil Accomodation	Construction of Satellite Township with Multi-storied Flat Building at Section 9, Mirpur, Dhaka.	Procurement Stage - RFQ
13.	Transport	Flyover from Santinagar to Mawa Road via 4th (New) Bridge over Buriganga River.	Project Development Stage - Feasibility Study
14.	Tourism	5 Star Hotel at Zakir Hossen Road, Chittagong.	Project Development Stage - Feasibility Study
15.	Civil Accomodation	Construction of BSS Bhaban under PPP.	Project Development Stage - Feasibility Study
16.	Transport	Hemayetpur-Singair-Manikganj PPP Road.	Project Development Stage - Feasibility Study

*Appendix E: PPP Projects List of Bangladesh in Infrastructure Sector*

The list of CCEA/LM approved projects under the Public Private Partnership Programme:

<b>SL</b>	<b>Sector</b>	<b>Project Name</b>	<b>Status</b>
17.	Zone	Economic Zone 2: Mirersharai.	Project Development Stage - Feasibility Study
18.	Transport	Dhaka-Chittagong Access Controlled Highway.	Project Development Stage - Feasibility Study
19.	Zone	Economic Zone 3: Sherpur.	Project Development Stage - Feasibility Study
20.	Zone	Economic Zone 5: Anowara, Chittagong.	Project Development Stage - Feasibility Study
21.	Transport	Construction of a Railway Bridge parallel to the existing Bangabandhu Bridge with provision of Dual Gauge Double Track-over the river Jamuna.	Project Development Stage - Feasibility Study
22.	Transport	Construction of Railway bridge over river Jamuna near Fulchhari Bahadurabad Ghat including approach Rail links.	Project Development Stage - Feasibility Study
23.	Transport	Dhaka-Ashulia Elevated Expressway.	Project Development Stage - Feasibility Study
24.	Zone	Hi-Tech Park in Sylhet.	Project Development Stage - Advisor Appointment
25.	Transport	Jatrabari-Sultana Kamal Bridge-Tarabo PPP Road.	Project Development Stage - Advisor Appointment
26.	Transport	Construction of Laldia Bulk Terminal.	Project Development Stage - Feasibility Study
27.	Transport	Construction & Operation of Inland Container Terminal (ICT) at Khanpur.	Project Development Stage - Feasibility Study
28.	Education	Medical College and Modernization of Railway Hospital at CRB in Chittagong.	Project Development Stage - Feasibility Study
29.	Education	Medical College & Nursing Institute and Modernization Railway Hospital of Kamlapur.	Project Development Stage - Advisor Appointment
30.	Civil Accomodation	Shopping Mall with Hotel-cum-Guest House on the unused Railway land in Comilla.	Project Development Stage - Feasibility Study
31.	Civil Accomodation	Shopping Mall with Hotel-cum-Guest House on the unused land in Chittagong.	Project Development Stage - Feasibility Study
32.	Civil Accomodation	Shoping Mall with Hotel-cum-Guest House on the unused Railway land in Khulna	Project Development Stage - Feasibility Study

*Appendix E: PPP Projects List of Bangladesh in Infrastructure Sector*

The list of CCEA/LM approved projects under the Public Private Partnership Programme:

SL	Sector	Project Name	Status
33.	Tourism	Establishment of Intl. Standard Tourism Complex at Existing Motel Upal Compound of BPC at Cox's Bazar.	Project Development Stage - Advisor Appointment
34.	Transport	Construction of a New Inland Container Depot (ICD) near Dhirasram Railway Station.	Project Development Stage - Advisor Appointment
35.	Energy	Construction of LPG Import, Storage and Bottling Plant at Kumira or any Suitable Place at Chittagong Including Import Facilities of LPG, Jetty, Pipeline and Storage Tanks under PPP.	Project Development Stage - Advisor Appointment
36.	Zone	Economic Zone 1: Shirajgonj.	CCEA Approved
37.	Tourism	Establishment of Sabrang Exclusive Tourism Zone.	CCEA Approved
38.	Health	Medical College and Modernization of Railway Hospital at Saidpur in Nilphamary.	CCEA Approved
39.	Health	Medical College and Modernization of Railway Hospital at Paksey in Pabna.	CCEA Approved
40.	Health	New Modern Medical College & Hospital of 250 beds on the unused land in Khulna.	CCEA Approved
41.	Transport	2nd Padma Multipurpose Bridge at Paturia-Goalundo.	CCEA Approved
42.	Transport	3rd Sea Port.	CCEA Approved

Source: <http://www.pppo.gov.bd/projects.php>; Retrieved at 31.08.15



## Determinants of Entrepreneurial Economics in Bangladesh: An investigation

MUHAMMAD MAHBOOB ALI\*

**Abstract:** *Entrepreneurship is associated with economic factors. These economic factors will help to attain some sustainable development goals. Entrepreneurs can play vital role for attaining some goals of SDGs by 2030. Research question of the study whether economics possess a positive attitude towards entrepreneurship in Bangladesh? The study will use both primary and secondary sources. Through questionnaire data the study analyzed 111 questionnaires. Time period of the study is May 2017 to September, 2017. The study will determine odds ratios at 95% confidence interval (CI) is used to estimate the precision of the odds ratios. Z statistics and significance level will also be determined. The study found that Transaction charge is relatively high at bank is related to maintain of hazard in Bank is significant. Is related to Lengthy time for application processing to Sanction of credit time is high in Bank is significant. While the study observed that Courteous behavior of the bank personnel is related to Economic factor is to attain to become an entrepreneur is significant. The study observed that Top management need for sanctioning loan (RTM) is related to Hidden cost to sanction loan is needed is significant. Also from the data collection the study found that Startup cost is the main hindrance is related to Special help for women entrepreneur is significant. Nowadays education is a prime need for Entrepreneurial Economics. The study has been shown micro and macro factors of entrepreneurial economics. Following factors can be considered as micro factors: Innovation, male/female, creativity, startup cost and capital, customer need and want, product available, adding value and income change. Macro factors are: social innovation and capital, financial inclusion,*

\* Professor, Dhaka School of Economics, Constituent Institution of University of Dhaka, Bangladesh.

*Technological innovation, industrial and agricultural policy, behavioral economics, uncertainty versus risk, social cost benefit, savings transforming to investment, International trade and exchange, procurement, insurance, wage inflation and employment, supply chain management, value chain-domestic, regional and global. As such the study suggested for offering Bachelor of Entrepreneurial Economics and Master of Entrepreneurial Economics from Dhaka School of Economics under University of Dhaka.*

**Keywords:** *Multifactor productivity, capacity, Startups, Innovation and Invention, Institutions and Growth*

**JEL classification:** *D24, M13, O31, O43*

## 1. Introduction

Entrepreneurship is too much existence with economic factors. The accrual of influences of production process requires enlighten economic development which can be attained through entrepreneurs from input to output. From the historical perspectives entrepreneurship is related to economic growth plus changes which includes fulfillment of basic needs. As such it refers to economic development of a country. Economy of Bangladesh is progressing where role of the entrepreneur is vital. Both micro and macro factors play impact on entrepreneurial advancement of the economy where innovation at micro level and social innovation requires macro facta with micro foundation. To promote entrepreneurship technical assistance based business process with economic progress for sustainable and inclusive growth in Bangladesh is requiring to arrange. Entrepreneurship economy is combined factors in elevation of echelons of innovation collective effort by extraordinary side by side risk taking ability and startup cost which consequences of the formation of innovative schemes as well as new segments and productions processes. Driving amenities in the “new” low-cost that necessitate commercial free enterprise; connection between entrepreneurship and planned organization; outline for risk-taking plan; part of free enterprise in a great business and an analysis of the changes amid entrepreneurship and intrapreneurship; issues which ease and constrain intrapreneurship; the growth of an outline for application of economy free enterprise.

Joseph Schumpeter (1942) shared viewed, albeit with considerably more skepticism about the beneficial outcome than his colleagues during his time period. Rather, Schumpeter feared that the replacement of small and medium sized enterprise by large firms would negatively influence entrepreneurial values, innovation and technological change as mentioned by Braunerhjelm(2010) .

Evans (1949) argued that Entrepreneurs-very broadly defined-are those who organize, manage, and actively control the affairs of units that combine the factors of production. The economic freedom stemming from private ownership and free markets becomes a necessary condition for an overarching political freedom (Prychitko and Cuckovic, 1997). Mujeri and Singh (1998) described that the women are more likely to translate their economic resources into basic needs for the family than into consumer and prestige goods.

Entrepreneurial intention and mind set with attitude towards implementation of the idea is a dynamic phenomenon. It plays a vital role to play in economic progress of the country but needs perception of the customer. Private enterprise mechanisms as inventiveness and the development of originality are required for creating a favorable business environment with push factor of economic progress.

Sustainable Development Goals (SDGs) possess 17 Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected - often the key to success on one will involve tackling issues more commonly associated with another. The SDGs work in the spirit of partnership and pragmatism to make the right choices now to improve life, in a sustainable way, for future generations. Entrepreneurship can help to attain following SDGs goal no. 1,2,3,4,5,8, 9,10,11,16 out of 17 goals. SDG embodied the United Nations thinking an original breakthrough for the peers of a domestic-global ethos and sophistication. All-inclusive planned management, primal triangulation, community immunology, time revocable technique is important to execute. Chaves(2015) described that Entrepreneurship and its close relationship with sustainable development under three dimensions of sustainable development – economic, social and environment - and intergenerational recognition. Entrepreneurship is enabler, driver and empowering tool for sustainable development with far-reaching benefits. A country's support for entrepreneurship is a secure investment in empowering its citizens, in long-term wellbeing and prosperity as well as in building resilience (Chaves(2015)).

Following goals are given below:

Goal 1 End poverty in all its forms everywhere

Goal 2 End hunger, achieve food security and improve nutrition and promote sustainable agriculture.

Goal 3 Ensure healthy lives and promote well-being for all at all ages

Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Goal 5 Achieve gender equality and empower all women and girls.

Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10 Reduce inequality within and among countries

Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable Goal

Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

(Source: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/> viewed on 1<sup>st</sup> April,2017)

Mapping between SDGs and entrepreneurial economics ought to create empowerment of people. The study has shown relationship among public sector, private sector, community economic development, public sector nonprofits, social economy businesses, civil society organizations which leads to social economy in following figure.



Source: <https://www.chanakyaiacademy.com/blog/item/770-social-entrepreneurship-to-embrace-socio-economic> (viewed on 1<sup>st</sup> Septemeber,2017)

Channeling the saving and investment relates to create social capital which ultimately play important role in the economy where branding of the product is important. Economic impact of entrepreneurs need to create marketing opportunities, customization of local branding along with use of local economy and resources and pricing dilemma and strategy as customer must accept the price with ethical and moral issues. Adding the value creates to marketing mix relate to chain impact. The shortage of employment prospects in the formal market is assisting to elevate employment rate at formal sector. SMEs, financial institutions, parents and extended family members”.

Contributions towards entrepreneurial intentions can be discussed as entrepreneurship has to reap profit for their business and it can be any business, entrepreneurship business should have start-up financing companies to share their risk, the higher education facilitators always should insist upon entrepreneurship as an career option, entrepreneurs to manage their positive return from investments and they should be their investors, entrepreneurs are largely responsible for new innovations, technologies and products, student entrepreneurs require a small seed grant or (start-up-fund) from government or private source would encourage entrepreneurship better, management students should seriously consider entrepreneurship. Factors affecting entrepreneurship includes Infrastructure: Physical-Social; Institutionalization; Financial Access; Economic Factor; Education; Gender Balance; Empowerment of People; R&D; Ecological balances; Participation in Global value chain process.

Table1: Contribution of manufacturing industry in Bangladesh  
(in Percentage and base year 2005-06)

Industry	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17*	Rate of contribution from 2008-09 to 2016-17
Small And Cottage Industry	7.30	8.17	5.67	6.58	8.81	6.33	8.54	9.06	9.21	20.73
Medium And Large Industry	6.54	6.27	11.11	10.76	10.65	9.32	10.70	12.26	11.32	42.27
Ttoal	6.69	6.65	10.01	9.96	10.31	8.77	10.31	11.69	10.96	38.96

Source: Bangladesh Arthanaitic Samikhya,2017

\*Means Tentative

In the table 1 we find that in the year 2008-09 contribution of Small and Cottage industry is 7.30 % while in 2016-17 it is 9.21. In 2008-09 Medium and large industry contribution is 6.54 % but in 2016-17 it is estimated that 11.32 %. So

Medium and large industry contribution is rising than the contribution of Small and Cottage industry. .Meanwhile ,rate of contribution from 2008-09 to 2016-17 rises in case of Small and Cottage industry is 20.73 %, Medium and large industry contribution is rising 42.27% and totally rises for 38.96%.

As per Bangladesh Bank, new classification of small and medium enterprises are done recently which is shown in Table 2.

New Classification of Smes			
Enterprise	Fixed Assets excluding land and buildings	Employees	Loan Limit
MICRO	Tk 10 lakh-Tk 75 lakh (Manufacturing)	16-30 or less	Tk 1cr
	Less than Tk 10 lakh (Service)	15 max	Tk 25 lakh
COTTAGE	Less than Tk 10 lakh	15 max	Tk 10 lakh
SMALL	Tk 75 lakh-Tk 15cr (Manufacturing)	31-120	Tk 20 cr
	Tk 10 lakh-Tk 2cr (Service)	16-50	Tk 5cr
MEDIUM	Tk 15 crore-Tk 50cr (Manufacturing)	121-300 (Garments 1,000 min)	Tk 75cr
	Tk 2 crore-Tk 30cr (Service)	51-120	Tk 50cr
TRADING SECTOR	Less than Tk 10 lakh (Micro Enterprise)	15 max	Tk 25 lakh
	Tk 10 lakh-Tk 2cr (Small Industry)	16-50	Tk 5cr

(Source: BB updates SME terms, Daily Star, Bangladesh July 03, 2017)

### 1.1 Historical Background of Entrepreneurial Economics

Entrepreneur need to become bold, authorities, risk taking for betterment of the society and organization towards free enterprise settings with economic expansion of the country as well as to attain equitable justice an social income equality.

Evans (1942) observed that while definitions of terms must vary with the purposes of their use, several studies of American entrepreneurship might be started with the word entrepreneur confined to those business executives who are associated with (a) the organization of new business units, (b) substantial expansions of established units, and (c) strenuous efforts to adapt established units to a changing environment. Such a conception, which uses terms that would obviously have to be made more precise as a study progressed, excludes from the term entrepreneur those business executives who carry on more or less routine

operations, and it directs attention to the dynamic activities of businessmen. It is a little broader than a strict interpretation of the term innovator and fits fairly well the idea implicit in many definitions of the term entrepreneur, namely, that the entrepreneur is the businessman who introduces new ideas and changes the rate at which the wheels of enterprise go 'round. Moreover, it utilizes three types of business activity concerning which there are data available for studies of the policy-determining executive.

Hinterhuber (1992) points out a special relationship between the entrepreneurial vision and the person: entrepreneurial ideas, he says, are an expression of one's own life and professional experience. He even speaks of the feeling of a mission. This sense of mission must be present to set free the energies needed to market a product successfully (Source: <https://www.entrepreneurship.de/ressourcen/publikationen/competencies/understand-entrepreneurship/economic-theory/> viewed on 1<sup>st</sup> August 2,17).

Prychitko and Cuckovic (1997) described that Mises and Hayek developed a modern society owes its preservation to private or separate ownership of the means of production and to market-exchange processes. The economic freedom stemming from private ownership and free markets becomes a necessary condition for an overarching political freedom.

Casson (2003) depicted that First, the neoclassical school of economics made very extreme assumptions about access to information. Simple neoclassical models assume that everyone has free access to all the information they require for taking decisions. This assumption reduces decision making to the mechanical application of mathematical rules for optimization. It trivializes decision making, and makes it impossible to analyse the role of entrepreneurs in taking decisions of a particular kind. Secondly, the Austrian school of economics, which takes the entrepreneur more seriously, is committed to extreme subjectivism – a philosophical standpoint which makes a predictive theory of the entrepreneur impossible. Austrians argue that anyone who has the sort of information necessary to predict the behaviour of entrepreneurs has a strong incentive to stop theorizing and become an entrepreneur himself. They suggest, furthermore, that by entering the system himself, the theorist might well generate a behavioural response which would falsify his own prediction.

Holt (2016) briefly described historical background of the Entrepreneurship. According to Holt (2016) "Richard Clinton, is credited with giving the concept of entrepreneurship, a role in economics.....Adam Smith spoke of the enterprises in 1776.French economist Jean Baptiste Say described an entrepreneur as one

who possessed certain arts and skills of creating new economic enterprise. Say, combined the „economic risk taker” of Cantillon “ and industrial manager” of Smith. In 1848 ,John Stuart Mill elaborated on the necessity of entrepreneurship in private enterprise...Carl Menger established the subjective perspective of “Economics”.

In the 16<sup>th</sup> Century, organized and led by French military expedition is known as an Entrepreneur. While in the 17<sup>th</sup> Century who did the effort of public contractor was known as Entrepreneur. During the 18<sup>th</sup> Century French Economist Richard Cantillon used Entrepreneur Entrepreneurs, according to Cantillon, are non-fixed income earners who pay known costs of production but earn uncertain incomes, due to the speculative nature of pandering to an unknown demand for their product. Jean-Baptiste Say was credited for coining the word and advancing the concept of the entrepreneur. Say pointed out that it was entrepreneurs who sought out inefficient uses of resources and capital and moved them into more productive, higher yield areas. Simply put, entrepreneurs seek opportunities for profit and, by doing so, create new markets and fresh opportunities.

Śledzik (2013) mentioned that Joseph Schumpeter “carrying out innovations is the only function which is fundamental in history”. He also accented that it is entrepreneurship” replaces today’s are to optimum with tomorrow’s different new thing”. Bangladesh need to progressively shift away from dependence on primary resource production and commodity-based industries to open up to international trade and to building capacity in some knowledge-intensive industries. However, the country’s economic growth has remained weak by emerging-market standards, with GDP rising at 3.1% per year from 2000 to 2014. The British ‘industrial revolution’ from the late eighteenth century was closely associated with the beginnings of a shift from a cottage system of outworkers using hand tools in cotton manufacture to the deployment of machine tools located in centralized factories.

Schumpeter described that development is a historical process of structural changes, substantially driven by innovation:

- Launch of a new product or a new species of already known product
- Application of new methods of production or sales of a product Opening of a new market
- Acquiring of new sources of supply of raw material or semi-finished goods;
- New industry structure such as the creation or destruction of a monopoly position.



Innovation: innovation is the “creative destruction” that develops the economy while the entrepreneur performs the function of the change creator. Competition and innovation may lead to “creative destruction”.

Creation of new products and methods destroys the old products and methods.

To provide risk, capital to high potential ventures in exchange for partial ownership of the firm, venture capitalists are typically active investors who seek to add value through their inter-action with and advice for the managers of the entrepreneurial venture (Arthurs and Busenitz,2003).

Gordon(2016) described that the free market system requires that entrepreneurs who are taking risks by starting a new business have a high probability of a making decent profit to reward them for their effort and for the risk they are taking that their business may fail.

Luebke (viewed on 17 Septmebr,2017 argued that Peter F. Drucker described that innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service. Drucker wrote that purposeful innovation results from analysis, systemic review and hard work and can be taught, replicated and learned. Peter F. Drucker described that innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service. Drucker wrote that purposeful innovation results from analysis, systemic review and hard work and can be taught, replicated and learned. Innovation is both conceptual and perceptual. Drucker wrote that an innovation has to be simple and it has to be focused.

Entrepreneurs typically start firms with an innovative idea with the anticipation that the venture will become a long-term success.

Entrepreneurship refers to Innovation, creation, and distribution of value and benefits to individuals, groups, organization, and society. Drucker gave three conditions for an innovation: Innovation is work. It requires knowledge, ingenuity, creativity, diligence, perseverance and commitment. To succeed, innovators must build on their own strengths. Innovation is an effect on economy and society, a change in the behavior of customers, teachers, farmers, of doctors, people in general. Innovation must always be close to the market, focused on the market, and market driven.

Rocha (2012) depicted that economics of Entrepreneurship is an emerging and growing academic interest, so we could expect great developments of the topic, both theoretical and empirical, in the near future.

Cassimet al.(2014) argued that stimulation of entrepreneurship and small business is important, the global competitiveness race and the moves occurring in other parts of the world require to hasten towards the development and adoption of policies that encourage innovation and entrepreneurship.

Sen (2010) answered “The business community plays a unique role but they are also part of the society. They should not get into making quick money on the sly. They have to think big, not just in terms of money, but also in terms of remedies for the society.”

Blanchard et al. (2009) argued that if workers are both mere risk averse than firms and have limited access to financial markets, firms be in a position to partly insure them against income fluctuations. Thomas et al.(2010) commented that social economic efficiency exists when the goods and services that society desires are produced and consumed in either production or consumption. They argued that to reach this goal, two efficiency conditions must be fulfilled productive efficiency and allocative efficiency.

Studies about entrepreneurs in Economics, Psychology and Sociology largely relate to four major currents of thought. Max Weber emphasized its occurrence in the context of a religious belief system, thereby suggesting that some belief systems do not encourage entrepreneurship. K Samuelson believe that there is no relationship between religion, economic development and entrepreneurship. Karl Marx considered the economic system and mode of production as its sole determinants. Weber suggested a direct relation between the ethics and economic system as both intensively interacted. Another current of thought underscores the motivational aspects of personal achievement (<https://courses.lumenlearning.com/boundless-business/chapter/introduction-to-entrepreneurship/> viewed on 1<sup>st</sup> Septmebr,2017).

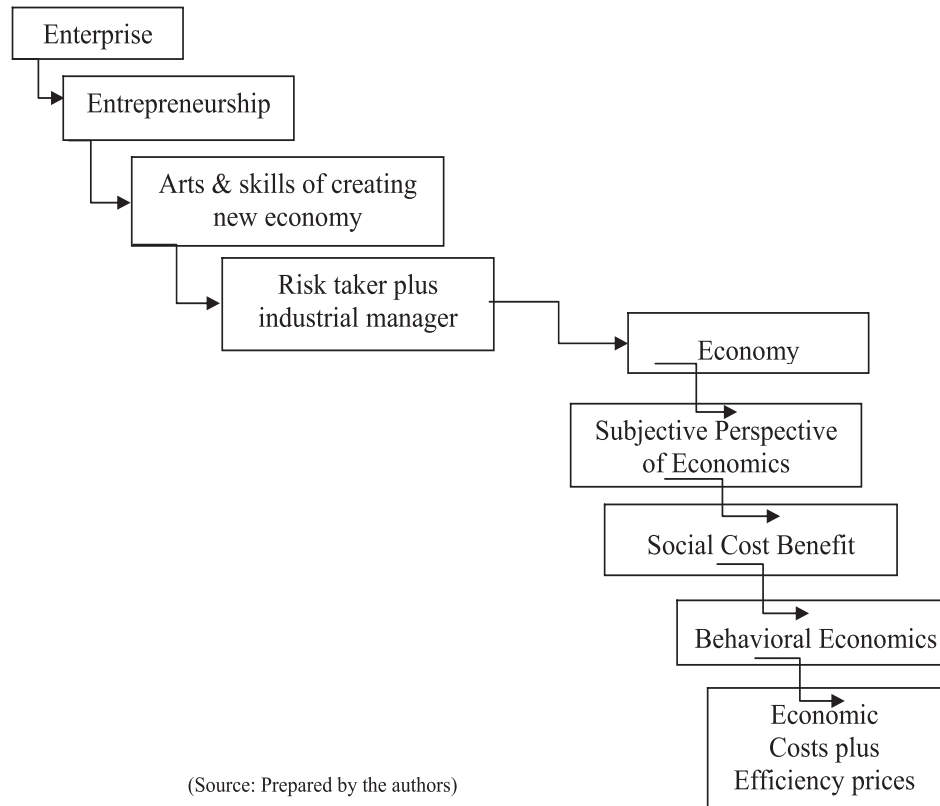
On the basis of aforesaid discussion we are showing historical background of Entrepreneurial economics in Figure 1.

Entrepreneurship in the economic progress requires combination of the capacity of invention, venture and extension. Capacity to grow the economic progress is being necessitated by the entrepreneurs.

## **2. Literature Review**

Nobel Laureate Schultz (1979) described “Farmers the world over, in dealing with costs, returns and risks, are calculating economic agents. Within their small, individual, allocative domain they are fine-tuning entrepreneurs, tuning so subtly

Figure 1: Historical background of Entrepreneurial Economics.



that many experts fail to recognize how efficient they are. I first presented an analysis of this entrepreneurial behaviour in *Transforming Traditional Agriculture* (Schultz, 1964). Although farmers differ for reasons of schooling, health and experience in their ability to perceive, to interpret and to take appropriate action in responding to new information, they provide an essential human resource which is entrepreneurship (Welch, 1970, 1978; Evenson, 1978). On most farms there is a second enterprise, the household. Women are also entrepreneurs in allocating their own time and in using farm products and purchased goods in household production (Schultz, 1974). This allocative ability is supplied by millions of men and women on small-scale producing units; agriculture is in general a highly decentralized sector of the economy. Where governments have taken over this function in farming, they have prevented this entrepreneurial talent from being used and these governments have been unsuccessful in providing an effective allocative substitute, capable of modernizing agriculture. The allocative roles of farmers and of farm women are important and their economic opportunities really matter.”

Ahmed (1987) described that small scale industries are generally owned and controlled by individual proprietors or partners or at best by a limited number of shareholders. The owners are often managers as well as financiers of their businesses.

Ghemawat et al.(2001)research in industrial organization(IO) economics is helpful. It suggests that commitments to durable, specific resources what might be called sticky resources –are generally needed to sustain within–industry profit differences.

Hirshleifer and Riley (2002) depicted that theoretical role of self-fulfilling beliefs simply as an assumption, and to warn casual acceptance of the empirical validity of rational expectations as the real-world analog of (SFP).

Co and Mitchell (2006) described that the entrepreneurship education is in its developmental stage, although it is perceived as important in elevating the profile of any institution and there is increasing commitment from the institutions in academic, research and outreach offerings in entrepreneurship. Research limitations/implications: Although all HEIs were requested to become respondents in this survey, some have decided not to participate. Also, some academics involved in entrepreneurship may have been excluded if they are not on the e-mail list.

Omotoso, and Daramola (2005) observed that overall entrepreneurial rating of the study group is low, essential input cannot be easily gotten in the area. They argued that the need to help them to acquire modern skills hence general improvement in their livelihoods.

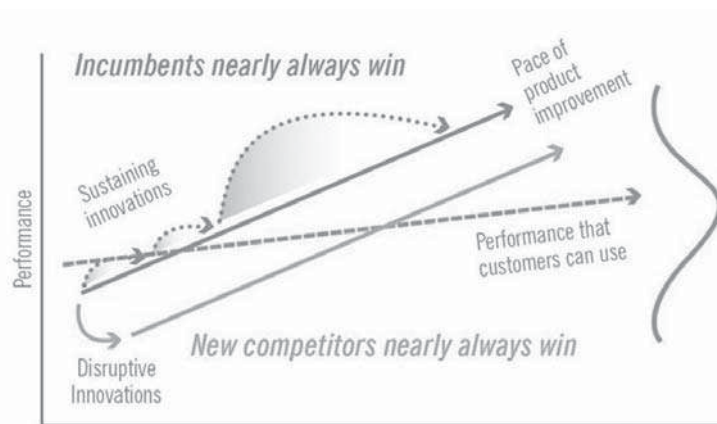
Gattorna (2006) described that the fully flexible supply chain in pursuing the ultimate quest for a creative solution to an unusual supply chain issue.

Baumol and Blider (2006) commented that free market capitalism has proved to be the most powerful engine of economic growth and innovation ever known. The increased creation, faster dissemination, and accelerated utilization of inventions is surely no accident. There is something about the way that modern economy works that makes it outstrip all of its predecessors in terms of the creation and utilization of new technology –and to do so with little let up for more than two centuries.

Bloom, Christos, Raffaella and Reenen (2012) described that in manufacturing American, Japanese, and German firms are the best managed. Firms in developing countries, such as Brazil, China and India tend to be poorly managed. American retail firms and hospitals are also well managed by international standards,

although American schools are worse managed than those in several other developed countries. They also find substantial variation in management practices across organizations in every country and every sector, mirroring the heterogeneity in the spread of performance in these sectors. One factor linked to this variation is ownership. Government, family, and founder owned firms are usually poorly managed, while multinational, dispersed shareholder and private-equity owned firms are typically well managed. Stronger product market competition and higher worker skills are associated with better management practices. Less regulated labor markets are associated with improvements in incentive management practices such as performance based promotion.

Disruptive innovations don't, by traditional measures, meet existing customers' needs as well as currently available products or services. They may lack certain features or capabilities of the established goods, for example. However, they are typically simpler, more convenient, and less expensive, so they appeal to new or less-demanding customers. (Christensen et al. 2006)



Source: Clayton Christensen, *The Innovators Solution*

Note: adopted from <http://folksonomy.co/?keyword=13633>

Chatterjee (2008) opined that innovation of structure and technology must be preceded by alteration and enrichment of human consciousness. To change or not to change –that is a more decisive question than the question how to change.

Gali (2008) observed that potentially large and persistent fluctuations in the nominal exchange rate as well as in some inflation measures ,are not necessarily undesirable, nor do they require a policy responses aimed at damping such fluctuations. Sowell (2008) argued that what economic analysis of market does it

utilize a body of knowledge ,analysis ,and experience that has accumulated and developed over a period of centuries to systematically examine the consequences of various economic actions and polices.

Sundararajan and Kohil (2008) observed that “net inward private capital flows to emerging market economies” have risen sharply in recent years, while exhibiting significant period-to period volatility.

Meier and Rauch (2009) commented that in order to minimize uncertainty for the firm, the system of incentive should be stable and automatic.

Michl(2009) observed that the marginal product of labour is construct which means it is equal to the average product of labour and both are made equal by the choice of labor units.

Summers(2009) argued that organizations practicing total quality management principles create a customer-focused management system and company culture that seeks to meet their customers’ needs the first time and every time.

Salim(2010) commented that in order to improve productivity ,efficiency and cost effectiveness of the small-scale sector a programme of modernization and technological up gradation was proposed.

Syverson(2011) described that there was a prominent distinction between aggregate productivity growth coming from “within” (productivity growth at a given plant or firm) and “between” (reallocation-based selection across existing businesses or entry and exit) sources. Just as the literature still needs to characterize the relative quantitative contribution of various influences on producer-level efficiency, so too does it need to measure the relative importance of within and between components in explaining aggregate productivity growth.

Motiwalla and Thompson(2012) depicted that information integration refers to the sharing of information among the members of supply chain.

Charantimath (2014) mentioned that economic analysis is also called social-cost-benefit analysis and is mainly concerned with judging a project from the social point of view. Economic analysis requires finding a variety of information on economic costs and benefits measured in terms of the efficiency prices, employment to be generated by the project, impact of the project on the distribution of income in society and the impact of the project on the level of savings and investment in society.

Cavusgil, Knight, Reiesenberger (2014) described that due to smaller size, SMEs are often target specialized products to market niches too small to interest large MNEs.

DeLancey (2014) commented that South Korea has secured a place in the global economy due to the success of its conglomerates such as Samsung, Hyundai, Posco, and LG that started as small businesses. While entrepreneurship is considered the backbone of any economy, in Korea, women still struggle to participate due to various obstacles. The study found that women's attitudes toward their economic contributions to the nation are affected by traditional cultural barriers which prevent them from breaking the glass ceiling.

Mel, McKenzie and Woodruff (2014) described that for women in business, training changes business practices but has no impact on business profits, sales or capital stock. The grant plus training combination increases business profitability in the first eight months, but this impact dissipates in the second year. Among potential startups, business training hastens entry – without changing longer-term ownership rates – and increases profitability.

Wiguna and Manzilati (2014) described that started from the economic system of United States; the social entrepreneurship has result in its main orientation, that is profit. It develops a strategy which divides economic and social aspects in delivering its activities of business. The performance of social entrepreneurship is measured economically as it applies the resource utilization exploitatively and desire-based. On the other hand, socio-entrepreneurship started from the economic system of Europe. It has its main orientation to process and behavior, putting its effort to create social improvement. Integrating the economic and social aspects, socio- entrepreneurship oversees the effort to contribute to the social process, since social improvement is not-measurable. It applies the resource utilization in a need basis standpoint.

ILO (2015) described that Green entrepreneurship will complement the government's existing policy initiatives to mitigate climate change. The current initiatives are broad, including green financing schemes, national waste management and recycling programmes and the promotion of green skills and green energy. The three million households using solar energy in Bangladesh are just one example of how serious the government is about greening the country.

Krugman and Wells (2015) argued that business run by the owner often fall to calculate the opportunity cost of the owner's time in running the business. In that way, small businesses often underestimate their opportunity costs and overestimate their economic profit of staying in business.

Littlewood and Holt (2015) observed that social entrepreneurship considering a framework of new institutional theories and writing on new venture creation, this

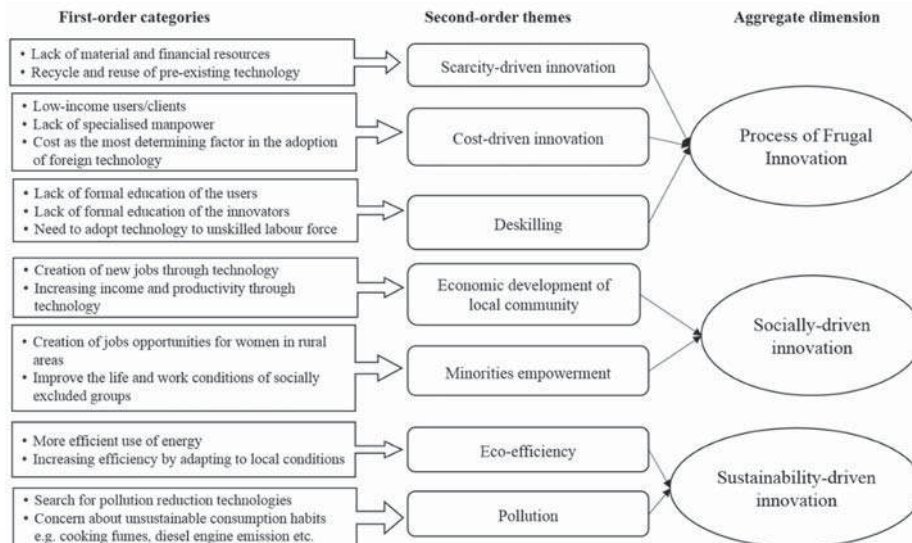
research explores the significance of environment for the process of social entrepreneurship, for social enterprises, and for social entrepreneurs.

McConnell, Brue and Flynn (2015) argued that entrepreneurs would like to earn more than a normal profit. They are constantly attempting two different strategies for increasing profits: attempting to lower the production costs of existing products through better technology or improved business organization; for earning a rate of return greater than a normal profit is to try to develop a totally new product that is popular with consumer.

Day (2016) depicted that by arming small businesses with the right technology, their ability to help achieve the SDGs by 2030, creating more and better jobs and breakthrough innovations that will impact the three dimensions of sustainable development for good.

Hunger and Wheelen (2016) depicted that economic forces regulate the exchange of materials, money, energy and information.

Pansera and Sarkar (2016) argued that the grassroots phenomenon can be fruitfully exploited to achieve the new Sustainable Development Goals proposed by the UN as a post-2015 strategy for the future of global governance. These innovations might have a tremendous impact not only in terms of serving unmet and ignored consumer needs, but also longer term impacts through enhanced productivity, sustainability, poverty reduction and inclusion promotion.



(Source: Pansera and Sarkar (2016))



ILO report (viewed on 1st November, 2017) argued that at the macro-economic level, it has been observed that minimum wages may prompt low productivity firms to leave the market and higher-productivity firms to expand – thereby raising overall efficiency of the economy([http:// www.ilo.org/ wcmssp5/ groups/ public/—ed\\_protect/—protrav/—travail/ documents/ genericdocument/ wcms\\_476157.pdf](http://www.ilo.org/wcmsp5/groups/public/-ed_protect/-protrav/-travail/documents/genericdocument/wcms_476157.pdf)).

Entrepreneurial self-efficacy (ESE) had already experienced a significant build-up in interest for some years. Since then this interest has been continuously growing. This can, to some extent be explained by the increased attention that has been given to entrepreneurship in general, but especially by the increasing focus on entrepreneurial education (EE) (Günzel-Jensen, 2017).

Ahmad (2017) argued that Bangladesh is trying heart and soul to attain SDGs in due time. Disruptive technology lacks refinement, often has performance problems because it is new, appeals to a limited audience and may not yet have a proven practical application.

### **3. Objectives**

- To determine factors of entrepreneurial economics;
- To appreciate the connection between entrepreneurial assertiveness and entrepreneurial Setting within the Formal framework
- To recognize the connection between entrepreneurial economic affairs and entrepreneurial Environment
- To scrutinize the affiliation between demographic profile of entrepreneurs and their Business activities.
- To provide some implications.

### **4. Methodology**

The study will use both primary and secondary sources. Through questionnaire data will be collected from Comilla district and Tangail District. Total questionnaires were distributed among the 125 entrepreneurs and received 111 questionnaires. Following table: 3 types of entrepreneurial activities, no. of entrepreneurs and weighted average of the respondents.

Though the study collected both male and female entrepreneurs' .However, along with other demographic factors the study reported it in the Present status section.

The study will determine odds ratios which is used to associate the relative odds of the occurrence of the outcome of attention, given exposure to the variable of

Table 3: Respondents of the Entrepreneurs

Sl.No.	Type of Entrepreneurial activities	No. of Entrepreneurs	Weighted average
1.	Skill development	9	.08
2.	Solar power	11	.1
3.	Pisciculture	15	.14
4.	Goat rearing, poultry, fattening of cows and vegetable farming	28	.25
5.	Farming of mango, potato, improved quality seeds	12	.11
6.	Pre-Primary Education	9	.08
7.	Food and Nutrition	10	.09
8.	RMG owner	2	.02
9.	firewood saving stoves	8	.07
10.	Renewable Energy	3	.025
9.	Others	4	.035
	Total	111	1

(Source; Authors)

concentration .Odds ratio may be equal to one, greater than one or less than one. For instance when odds ratio is greater than  $>1$ , then exposure associated with higher odds of outcome. Odds ratio too be applied to control whether a certain contact is a hazard effect for a precise consequence, and to associate the scale of several risk influences for that consequence. The 95% confidence interval (CI) is used to estimate the precision of the odds ratios. Z statistics and significance level will also be determined.

For the study to calculate odd ratio it was considered that relationship between Transaction charges is relatively high at bank and maintenance of bank account is hazard. Another relationship between Lengthy time for application processing for bank loan and Sanction of credit time is high in Bank. Relationship between to Courteous behavior of the bank personnel and Economic factor is to attain to become an entrepreneur. Relationship with Top management need for sanctioning loan (RTM) and Hidden cost to sanction loan is needed. Startup cost is the main hindrance is related to Special help for women entrepreneur.

Exact sources of use of secondary sources will be given. Time period of the study is May 2017 to September, 2017.

## 5. Present Status

Strategically leverage: Traditional sectors and emerging industrial verticals could benefit from a combination of the following initiatives, including:

- Reintroducing incentives for technology adoption
- Developing channels for greater access to supply chains and international markets Strengthening the national quality infrastructure
- Addressing technological skills gaps

Building linkages between the enterprises and export oriented SMEs could be an important way to facilitate integration with global value chains and new markets.

Micro savings ought to come under the operational purview of the micro investment through social networking and community banking based system is required. Otherwise micro savings cannot give good results rather it will have some problems .Micro insurance will expedite the process along with financial inclusion .This will also help to transfer to formal sector from informal sector. Entrance to a bank account augmented in what way abundant market females were talented to capitalize in their occupational, on regular

Access to finance is a challenge in Bangladesh, where only 40 percent of the adult population holds a bank account at a formal financial institution. This is a major problem for the working poor, many of whom migrate from villages to towns, cities, and even overseas in search of work, and who have no choice but to use informal options to send money home. Some find an acquaintance willing to carry cash on the journey to their home village; others work with middlemen who charge high fees

In the free market economy govt. can intervene at least invisible manner. For poorer people, govt. need to set up some procedure of redistribution, arranging equitable righteousness, removing income inequality and to attain social justice. A community bank is a depository institution that is typically locally owned and operated.

Community banks tend to focus on the needs of the businesses and families where the bank holds branches and offices. Lending decisions are made by people who understand the local needs of families, businesses and farmers. Employees often reside within the communities they serve.

Social network is a sociological concept for a set of social relations between network elements that interact and which are in particular individuals. Social groups or teams, organizational units or whole organizations can also be network elements in the organization. Basic types of social network in the organization are: Formal organizational structure, Informal organizational structure.

Social networking is the exercise of intensifying the quantity of one's business and/or social contacts by constructing acquaintances from side to side entities,

often through social media along with social capital, social business and social investment. Social entrepreneurs are the people most able to deliver that innovation.

This is a social structure entailing of persons or collections who are associated to each other, for example through relationships. When these networks are characterized in a database and with a web interface, it is frequently mentioned to as a “social network service”. However, in traditional system there is no web interface or social media but social capital, social business and social investment works simultaneously.

A social network perspective on strategic alliances can have both descriptive and normative outcomes that provide valuable insights for theories of strategic management, organizational theory, and sociology. Incorporating social network factors into our account of the alliance behavior of firms not only provides us with a more accurate representation of the key influences on the strategic actions of firms, but has important implications for managerial practice as well, many of which have yet to be explored. Interest rate on lending in the informal sector is very much high in Bangladesh than the formal sector of the country.

Procedures to shape inclusive economic sectors would include: taking stock of the state of economic segment expansion and entree; investigating restraints; cooperating with outside associates; Assembling mechanical and economic support from advance associates; rallying legislators and shareholders, and nurturing their possession of a discourse procedure; structure a common image; examining rule choices and strategy preparation; safeguarding application and continuing appraisal.

The consequences of social relations within networks are not readily explained away on the basis of either human capital effects or the effects of organizational engagement. As such social intelligence and social entrepreneurship works with social networking. Social mixing should form an integral part of social intelligence development in teenagers. It argues that parents may have an important role to play, as older generations own circles also remain relatively closed to different cultures, backgrounds and upbringing.

Many experts found that across a number of instances of community technology, technology use is directly influenced of social networks, and social networks are directly influenced by technology use. It is also examined by various approaches from companies, public sector entities, philanthropy, and also institutional and private investors in their availability as well as their specific legal capacities and

limitations to deliver the funding required supporting the growth. Such initiatives are vital in the fight against poverty and income inequalities.

More intensive and pragmatic policy should be developed for the development of the social enterprises particularly for self-motivated entrepreneurs. Experiences from the research work, they observed that the rural poor are mobilized and working together in self-controlled community based organizations which ensures social welfare and Pareto optimality. Not only small and medium enterprises but also micro enterprises should get special priority and inclusion through financial organizations are being required for developing proper steps to poverty alleviation, public-private and foreign strategic alliances are required in the small and medium enterprise sector with special emphasis on micro enterprises of the country.

Social intelligence is also one of the key components to readdress to come out from poverty. In current century a greater role is being played by social media for which interpersonal connectivity is vital. Environmental scanning for doing the business is vital, specially to ease the business process and local economies. Empowerment of people rises from decision making process when people do have purchasing power capability.

Technological diffusion, innovation, creativity and suitable regulations by the local level planning with local level law of the province are the key to deepening financial inclusion analysis where nano saving must be transformed to nano investment. Community banking will help to expedite the process of social networking and ultimately empowerment of people and to create entrepreneur. Mindset of entrepreneurship should be built from childhood.

Economists found that money lender interest rates go up with the percentage of households borrowing from Micro Financial Institutes (MFIs). Productive investment of loan lowers moneylender interest rates. But MFI program expansion increases moneylender interest rates in the villages in which more loans are invested in productive economic activities. As loans are utilized in productive purposes, the likelihood of repayment increases so that moneylenders are able to charge lower interest rates.

Christensen et al. (2006) divided new technology into two categories: sustaining and disruptive.

Sustaining technology relies on incremental improvements to an already established technology. Entrepreneurship and innovation can lead to Economic growth plus change. Informal sector should be gradually converted to formal sector.

The year of 2021 stands as a matter of pride for Bangladesh. This time fifty years of the independence of the country would be completed. Under the cover of long-term economic plan Vision - 2021 has been undertaken under the leadership of Prime Minister Sheikh Hasina. If we make a post-mortem of the last 8 years of the Vision - 2021, the core substance is the 'Economics of Hands to Mouth Politics'. Vision - 2021 and perspective plan 2011-2021 are like fundamental base of forward march in the field of the economy of this country. Just after independence GDP growth was between 1.5-2 percent only. But at present it rose around 7 percent in the last eight years. The key nucleus of advancing into the socio-economic field is the empowerment of the common people. Per capita income is stand at more than 1610 US dollars by the end of 2016-17 financial year. On the other hand we are at an advanced stage compared to the neighboring countries in respect of indicators in women empowerment, human development and social advancement. For checking corruption, as a motivational factor the issue of establishing Truth Commission should be brought under consideration. Social and economic development that some countries of the world have done good in human resources indicators, some others have done better in economic fields whereas Bangladesh has advanced in both the fronts. Virtually both public and private sectors are playing equal role in the forward march of the country.

In reality the success of today has been expedited due to the far reaching Vision - 2021 and the perspective plan 2011-2021. The basic characteristics of the perspective plan is to establish a macro base in socio-economic fields and to make the foundation of micro economics of macroeconomics, to enhance Gross National Internal Saving to 8-9 percent, to raise per capita income to between \$4,086 and \$12,615 to upper middle income countries, to introduce digital system so that initiatives are taken widely for employment and through which about 90 percent employment opportunities would be created. That is why the present government has been working in making entrepreneurs class of people since long. Efforts would be directed to keep the rate of inflation between 6-8 percent or below it and the rate of poverty under 14 percent. The banking sector is being efficiently run although few black sheep were always there. Monetary policy is being directed to people oriented welfare. Side by side, Bangladesh Bank Governor as a strategic leader is working for financial inclusion to micro, small and medium scale enterprises. In multidivisional method the services of banking sector are functioned with multi-lateral measures so that people get favorable effects for investment side by side with savings. Simultaneously the rate of interest in the country has been lowered through special efforts to increase the volume of investment in the country. Moreover digitized endeavors have been

made to increase the repayments of defaulted loans. A good number of national steps have been taken to solve the electricity deficit problem of the country that has led to the achievement of the production capacity to 24000 megawatts electricity. At present steps have been taken to produce electricity in atomic energy and coal powered process. Arrangements have been taken to import electricity from India-Nepal-Bhutan.

The Government has taken sufficient number of positive steps for the reformation of infra-structure of the economy. The Padma Bridge Construction project has been undertaken with self-financing which when completed by 2018 would add extra 1.2 percent to the GDP. Construction of roads and connecting of lanes are going on. Simultaneously modernization of railway system is being done. Measures have been taken to build a balanced system of import substitute industry and export oriented industrialization in the country. The number of population in the country stands at over 16.8 crore now. If their purchasing power enhances consumption propensity would increase in the internal market. Market expansion would take place and employment opportunities would be created. As the people of the country would become self-reliant, so it would throw positive impacts on development set-up of the country.

For the diffusion of education of the females provision has been made for free tuition fee education up to degree level in place of present 12th class. 12.8 million Students received stipends during 2014. Out of them 75 percent is female. In practice, of the eight targets of Millennium Development Goals (MDGs) remarkable development in education, decrease of child death rate, diminution of poverty have been achieved.

The organizational framework of the NBR in the country should be more developed. Meantime, the system of e-TIN has been introduced. At a next step e-VAT system would be initiated. But the rate of direct tax should be enhanced. VAT of indirect tax if enhanced facilitates rich people to gain. Whereas the people of poor bracket do not get benefit from VAT. VAT is received more than once from different shops lying side by side which provides no proper scrutiny. The size of the ADP of the current financial year has been decreased a little. If the Annual Development Plan (ADP) is implemented properly the people get benefit in their flow of income. The present Tax-GDP ratio of 11 percent must be enhanced to 30 by Vision 2021. Enhancement of direct tax and for bringing tax administration into efficient management it should be brought under corporate governance. Incentive should be provided for proper management of the human resources.

A silent revolution goes on in building a digital Bangladesh. Information and service centers of about 4500 union councils of the country have been established. National web portal has been opened. Starting from the center up to union levels the number of web portal counts 24,000. Mobile phone has put positive role in improving the standard of living of the people. The number of mobile phone users are higher here than the other South Asian countries. The number of cell phone user is more than 10 crore. The programs that we see in building digital Bangladesh have virtually signified the success of present government. 4G system need to be introduced by the mobile operators. The expatriate Bangladeshis are sending remittances to the country. This money is putting positive role in the development of the country. The government has taken multifarious programs to send human resources abroad. A good number of training programs has been organized. These training programs should be properly implemented. Because the persons who go abroad for work either it is white collar job or a blue collar one, their training should be properly done. There should be arrangement of language learning of the country where the immigrant would leave for. Due to the geopolitical reasons value addition between the Asian countries should be affected. For this reason cordial relation should be built up. Rather when Asian global chain extends slowly it would only go in favor of Bangladesh if the country can build its own capacity. Off course, it would be very much helpful for Bangladesh if she could receive multidimensional co-operation from Asian countries.

Industrial transformation from agriculture-based position has taken place in the country. Extension of service sector is necessary. Here standard of education is to be ensured. Because investment in education is a positive return. For this reason educational institutions having qualitative excellence are necessary. It is to be kept under strict watch that the students are not brain-washed in the educational institutions. Observation is to be kept so that few so called terrorist and militant students can not damage the image of the country in home and abroad. Simultaneously through imparting qualitative education care should be kept so that the human resources are produced against the economic background of the country. As because economics is for the welfare of the people, so the state organization runs through the liabilities from the people. For the welfare of the people, one has to go to people of all strata starting from laborer and agriculturists. In the political economy system extension of market system has be done and imperfections are to be eliminated. Efforts have been made to turn market information symmetric that depends upon the sincerity of duties of the persons responsible for the matter.



In the context of making valuable contribution to the Bangladesh economy both the finance minister and the finance advisor are working provably through the last more than eight years. Their role in macroeconomic stability and extension, of market economy is worthy of pride. The role of the present government in women empowerment and child right establishment is also plausible.

Off course, there are some disguised opportunists in Bangladesh who with financial assistance of certain interested foreign agencies, inland vested quarters produce false and concocted statistics/information of development that mislead the people in and outside the country undermining the image of the government.

Work for reforms of capital market is going on. However, for over-all internal resource management and for development of large scale industries the capital market, debt market and derivative market extension should be done. Cloud computing has been a hugely disruptive technology in the business world; Cloud computing is encompassing everything from infrastructure as a service through a software to provide service.

In the middle, there is a platform tier providing the micro services that power the likes of Android and iPhone apps, and also many web-delivered services.

Incentive are not much operative to accomplish the inspiration to convert an innovative entrepreneur and the inferences through on the investigation of the boldness near free enterprise with the capacity to diagnose tactical opportunities, the free enterprise location and the inclusive entrepreneurial atmosphere plainly specifies that the optimally conducive for entrepreneurial performance. To endorse consciousness, the Foundation must present at free enterprise as share .Commercial incubator for minor professional growth, to deliver provision to the wishful businesspersons, inspire complicated in commercial doings .Part time employment, and campus entrepreneurship may be created for giving practical training and part of lifelong learning. The Institution management can be better off for economic benefits of entrepreneurs.

Overwhelmed the trial of making a setting that is appropriate for free enterprise. An economic provision scheme which lets for experimental and blunder ought to advance for Entrepreneurs preliminary their principal commercialization.

Competitiveness read to the set of issues, rules and organizations that regulate the side by side of yield of a country captivating into explanation its equal to growth. Attitude mentions to the person's mindset, predominantly adventuresome environment and stages of persistence, makings recognized as vital amid entrepreneurs. Services provided to the usual job-related and interactive expertise

obligatory to effectively originate or work in a fast-growing, ground-breaking organization. Traditional/community outline denotes to the usual of community and traditional influences that whichever provision or constrain a person's choice to involve in the innovative ecosystem moderately than extra work-related trails. Regulatory agenda discusses to the directorial procedures and rubrics obligatory to twitch and function a firm, including licensing, tax and labour market guidelines.

Market outline mentions to the obtainability of essential contributions, alteration procedures and customer demand essential to function and grow the undertaking. Network entree raises to the handiness of backup associates, consultants and enablers who transmission expertise and make chances for evolution. Innovation and entrepreneurship bid latent for transformational impact. This alteration would essential to be motivated by a growing concerned with programme that influences:

Export concerned with SMEs with strong growth potentiality is mandatory. Development concerned with start-up companies are essential. Industries are facing research and development capabilities with continuous changes.

Social entrepreneurship is applying innovative, market-based models to solve social problems – is about impact and scale, not just the product or service itself.

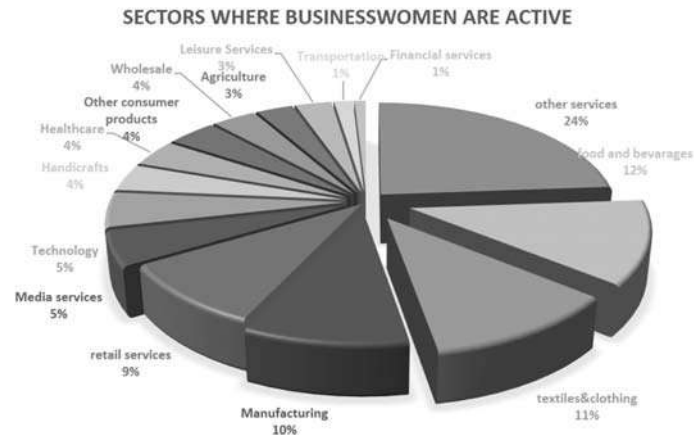
Social entrepreneurship in Bangladesh has progressed significantly over the last decade. More and more people are using entrepreneurial skills in building sustainable enterprises for profit and non-profit to effect will lead to alteration in Bangladesh. Please be noted that Social business is not a new phenomenon as it prevails in this subcontinent as it prevails for more than long 1000 years back.

Rashid(2017) described that Bangladesh's global market share increased, but the big question is how much our entrepreneur's reaped profit from RMG export? Although, country RMG sector already been set up a target to achieve \$50 billion by 2021.

Now let us see sectors where business women are active in Bangladesh in the following figure.

Key Problems for the Women Entrepreneurs may be understand from demand and supply side:

As of the feature of demand side: Anxiety of existence disallowed, aversion to have securities from associates, misgivings around defensive the scheme; Nonexistence of awareness on diverse accessible choices of funding arrangement;



Source: BWCCI

Absence of suitable expertise to assess the commercial particularly persons in the informal segments .Starting the supply-side perception: Monetary organizations; unwillingness to money aimed at start-ups; Inadequate possessions to shield the debt-burden ratio; Petite capitalization; Liability to market variations;

Absence of bookkeeping registers and insufficient financial statements; Nonexistence of business plans.

Issues delaying marketing of the manufactured goods: Absence of correct training; Nonexistence of raw materials; Deficiency of capital.

Influences delaying goods and services creation: Nonappearance of capital; Deficiency of good designers; Deficiency of skilled workers; In elevation value of materials; Absence of contemporary machineries; Absence of raw resources; Monetary Restraints; Deficiency of Infrastructural Services; Lack of supply chain management; Deficiency of Practical Support; Deprived Administrative and Practical Skills; The nonappearance of appropriate sales center or show room ability; Non availability of skilled labor or trained employees.

Women entrepreneurship is not solitary a basis of revenue generation but too a method of attaining financial freedom and BWCCI's need to emphasis on continuously on improvement in the rules to make an allowing setting for women crossways at the country.

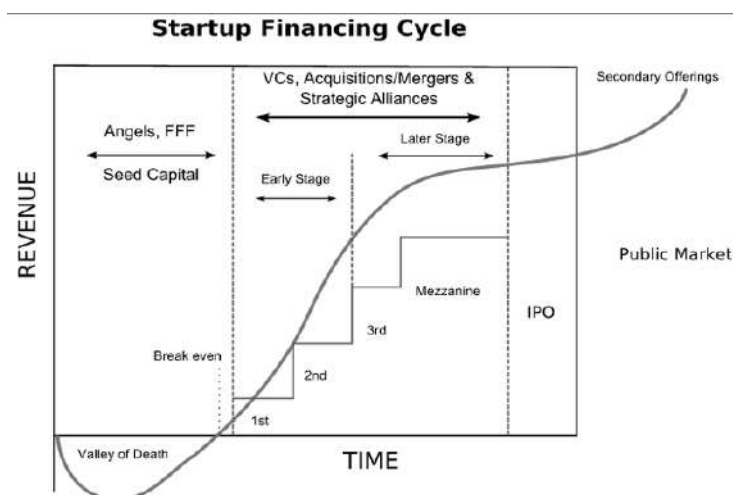
Though there are exodus numerous problematic in women entrepreneur growth but BWCCI is yet to devote to existence as a leader of inclusive originated economic growth in Bangladesh for professional women & industrialists.

MIDAS(2009) conducted a research that concluded sustained efforts are needed to enhance the capability of these women entrepreneurs as well as to create conditions for entrepreneurship to succeed in terms of setting up and maintaining productive operations. Many organizations have assisted women entrepreneurs in running business by providing different facilities for meeting their marketing and training requirements and many women entrepreneurs have emerged as successful manufacturers, exporters, importers, business agents and order suppliers by taking up challenging tasks previously unknown to them and initially posing as risky, uncertain and perilous.

In the informal sector lion share of micro entrepreneurs have been created and maximum are women. However, those who are pauper especially male mostly lack to get employment opportunity. Low level of start up financing creates problem in the imbalance. Currently 76,000 crore taka is rolling by the NGO sector of the country out of which 16,000 crore taka is using by PKSF to improve the livelihood of the country.

Due to high population density it is observed that young male population want to become entrepreneur but those who are lower income starta does not have any startup cost. PKSF recently took a plan to provide startup cost. Below the study has shown start up cycle.

Aforesaid startup financing cycle describes how over the time period revenue can be generated.



Source: <https://courses.lumenlearning.com/boundless-business/chapter/introduction-to-entrepreneurship>

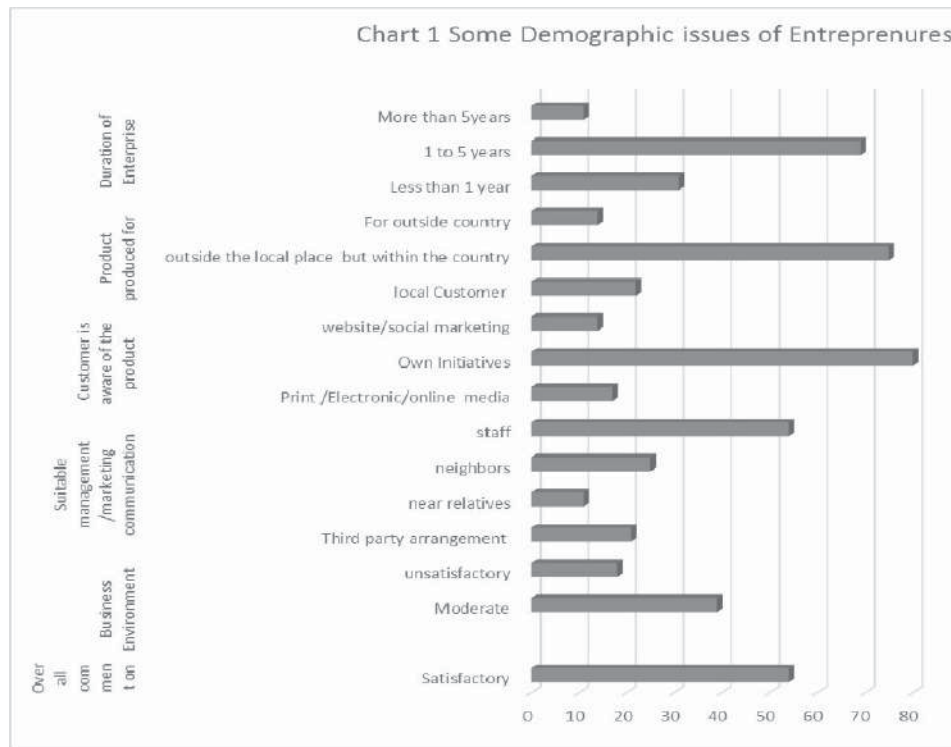
## 6. Estimated Results

Table:4 ,observed that 70% respondents are married and 30 % are unmarried. Level of education is highest up to HSC level is 34%. Among the respondents' age

<i>Table 4: Demographics of the Respondents</i>				
Description	Category	T	otal Number	Weighted Average
Marital status	(a) Married		77	.70
	(b) Single		34	.30
Level of education	(a) Below Class VIII		26	.24
	(b) up to SSC		19	.17
	(c) up to HSC		38	.34
	(d) Undergraduate and above		28	.25
Age	(a) Up to 25 years		6	.05
	(b)26-35 years		34	.31
	(c) 36-45years		39	.35
	(d) 46-55 years		11	.1
	(e) 55 years and above		21	.19
Gender	Male		76	.69
	Female		35	.31
Dependents on Entrepreneur Dependents	(a) Yes		99	.89
	(b) No		12	.11
No of dependents	(a) 1 person		14	.13
	(b) 2-3 persons		78	.70
	(c) > 3 persons		19	.17
Living of small entrepreneurs	(a) unmarried living with family		17	.15
	(b)Spouse/ father in-laws house		53	.48
	(c) mass-with other workers		32	.29
	(d) single		6	.05
	(e) with others		3	.03
Prestige in the family	(a)Raises		75	.67
	(b)Decreases		19	.18
	(c) Remains the same		17	.15
Social problem due to entrepreneurship	(a) Yes		54	.49
	(b) No		57	.51

Obstacles to do entrepreneurship due to lack of financial inclusion	(a) Yes	76	.69
	(b) No	35	.31
Innovative idea is supported by the family	(a) Acceptable	56	.51
	(b) Unacceptable	45	.40
	(c) Hope to get	10	.09
Net income & benefits received per month	(a) up to Taka 25000	23	.21
	(b) Taka 25001-50000	50	.45
	(c) Taka 50001-75000	23	.21
	(d) Taka 75001-100000	11	.1
	(e) Taka 100001-125000	3	.03
	(f) Taka 125001	1	.001
Overall comment on Business Environment	(a) Satisfactory	54	.49
	(b) Moderate	39	.35
	(c) unsatisfactory	18	.16
Suitable management /marketing communication	(a) Third party arrangement	21	.20
	(b) near relatives	11	.1
	(c) neighbors	25	.24
	(d) staff	54	.49
Customer is aware of the product	(a) Print /Electronic/Online media	17	.15
	(b) own initiatives	80	.72
	(c) website/social marketing	14	.13
Product produced for	(a) local Customer	22	.2
	(b) outside the local place but within the country	75	.67
	(c) For outside country	14	.13
Duration of Enterprise	Less than 1 year	31	.28
	1 to 5 years	69	.62
	More than 5 years	11	.1

Source: Developed for this research from survey



in between 36 and 45 years are 35% while 26 to 35 years are in between 31 percent. 69% is male entrepreneur while 31% is female entrepreneur. 89% entrepreneur has dependent. No. of dependent is highest in between 2 and 3 persons is 70%. Living of small entrepreneurs are highest in case of spouses/father in-laws houses is 48 percent. Prestige in the family raises is highest as 67 percent. Social problem due to entrepreneurship arises is not raised is 51 percent. 69% respondents thought that Obstacles to do entrepreneurship due to lack of financial inclusion arises. Innovative idea is supported by the family is accepted by 51%. Net income & benefits received per month is highest in case of in between Taka 25001-50000 which is 45%. 495 respondents commented that Business environment is satisfactory. Suitable management /marketing communication is mainly done by the staff is 49%.72% respondent uses own initiative. 67% argued that they product produced for outside the local place but within the country. Duration of Enterprise is highest is 62 % which is in between 1 and 5 years.

From table 5 we observed that as a motivational factor startup cost is 6.3%; Innovative Idea is 13.6%;support by financial institutions is 6.3%; Support by

informal sector is 9.9%; Value of Commodities is 8.1% ;Economic backing is 9%; Marketing services is 8.1%; Organizational support is 9.9%, Risk-taking ability is 9.9%; Fulfillment of customer need is 8.1% and social networking is 10.8%.

In table;6, as elements of entrepreneur- social capital is 13.6%;applicability and

*Table 5: Motivational factors to become effective Entrepreneur*

Motivational factor to become effective Entrepreneurship	Frequency	Weighted Average
Startup cost	7	0.063
Innovative Idea	15	0.136
Support by financial institutions	7	0.063
Support by informal sector	11	0.099
Value of Commodities	9	0.081
Economic backing	10	0.09
Marketing services	9	0.081
Organizational support	11	0.099
Risk-taking ability	11	0.099
Fulfillment of customer need	9	0.081
Social networking	12	0.108
Total	111	1.000

Source: Developed for this research from survey

adaption capability is 6.3%;Personal venture is 9% ;loan from Banking sector is 10.8% while loan from NGOs are 15.3%; From Mahajahan is 8.1%;Family savings is 9.9%;Through selling of property is 9%; Assistance through the social networking is 8.1% and reliable sources to accomplish the work is 9.9%.

From the table:7 ,the study observed following results:

In serial no. 1- a(Number of exposed cases) and b(Number of exposed non-cases) is related to Transaction charge is relatively high at bank while c (Number of unexposed cases)and d (Number of unexposed non-cases) is related to maintain of hazard in Bank. Odd ratio is 3.9600 and at 95% confidence interval is in between 1.9296 and 8.1269 while z statistics is 3.752 and is significant.

In serial no. 2- a(Number of exposed cases) and b(Number of exposed non-cases) is related to Lengthy time for application processing while c (Number of unexposed cases)and d (Number of unexposed non-cases) is related to Sanction of credit time is high in Bank. Odd ratio is 1.8272 and at 95% confidence interval is in between 0.9455 and 3.5312 while z statistics is 1.793 and is significant.



Table 6 Elements of Entrepreneur

Elements of Entrepreneur	Frequency	Weighted Average
Social capital	15	0.136
Applicability and adaption capability	7	0.063
Personal venture	10	0.09
Loan from Banking sector	12	0.108
Loan from NGOs	17	0.153
From Mahajahan	9	0.081
Family Savings	11	0.099
Selling of property	10	0.09
Assistance through the social networking	9	0.081
Reliable sources to accomplish the work	11	0.099
Total	111	1.000

Source: Developed for this research from survey

In serial no. 3- a(Number of exposed cases) and b(Number of exposed non-cases) is related to Courteous behavior of the bank personnel while c (Number of unexposed cases)and d (Number of unexposed non-cases) is related to Economic factor is to attain to become an entrepreneur. Odd ratio is 2. 6567 and at 95%

Table 7: Results of Odd ratio based on association of positive and negative outcome

Sl.	Cases with positive outcome	Cases with negative outcome	Odd Ratio	95% Confidence Interval	Z statistics	Significance level		
	a	b	c	d				
1.	99	12	75	36	3.9600	1.9296 to 8.1269	3.752	P=0.0002
2.	93	18	82	29	1.8272	0.9455 to 3.5312	1.793	P = 0.0729
3.	89	22	67	44	2.6567	1.4551 to 4.8506	3.181	P = 0.0015
4.	88	23	75	36	1.8365	1.0007 to 3.3703	1.962	P = 0.0497
5.	65	56	35	76	2.5204	1.4737 to 4.3106	3.376	P = 0.0007

Source: Calculation done from survey

confidence interval is in between 1.4551 and 4.8506 while z statistics is 3.181 and is significant.

In serial no. 4- a(Number of exposed cases) and b(Number of exposed non-cases) is related to Relationship with Top management need for sanctioning loan (RTM) while c (Number of unexposed cases)and d (Number of unexposed non-cases) is

related to Hidden cost to sanction loan is needed. Odd ratio is 1.8365 and at 95% confidence interval is in between 1.0007 and 3.3703 while z statistics is 1.962 and is significant.

In serial no. 5- a (Number of exposed cases) and b(Number of exposed non-cases) is related to Startup cost is the main hindrance while c (Number of unexposed cases)and d (Number of unexposed non-cases) is related to Special help for women entrepreneur. Odd ratio is 2.5204 and at 95% confidence interval is in between 1.4737 to 4.3106 while z statistics is 3.376 and is significant.

## 7. Discussions

Link between innovation and entrepreneurship, the role of institutions for entrepreneurship, and the tendency of national accounts to under-record the social value of innovation and entrepreneurship. If the measures used do not capture the full social value of innovation, we are likely to underestimate the genuine rate of innovation.

Least Developed countries suffers from the problem of informal sector where entrepreneurship grows but it is not properly counted. Both entrepreneurship and innovation are demanding creativity. Creativity is a process by which a symbolic domain in the culture is changed.

Creativity is a function of three components: Expertise; Creative thinking skills; Motivation. Creativity involves of expectation and obligation. Entrepreneurs essential to yield courageous creative ladders but circumstances inspire originality which needs proper educational guidance and economical support.

An entrepreneur is a person who has possession of a new enterprise, venture or idea and is accountable for the inherent risks and the outcome while a startup company or startup is a company with a limited operating history. These companies, generally newly created, are in a phase of development and research for markets.

Innovation for ecosystem and the challenges it faces, and it discourses the efforts ought to be arranged by the government towards the promotion of innovation for entrepreneurship development and sustainable growth.

Lifelong Learning and Innovation in Companies Entrepreneurial learning does not stop, say, five years after starting a firm. It will continue to develop depending on the initiatives employed by managers and their employees, as well as on the specific situational challenges the firms faces.

Entrepreneurship as a career path for young learners has gained importance and should be given its due share of consideration that it demands.

Entrepreneurial companies can contribute to economic welfare as they increase the innovative capacity of the economy. Traditional economics assumes an individual to be a rational decision maker. Coupling's recent discoveries in human psychology with a practical understanding of incentives and market behavior, Thaler's theory which enlightens about how to make smarter decisions in an increasingly mystifying world and opens up new ways to look at everything. *Misbehaving* is a singular look into profound human foibles. General principles and methodologies that is applicable across sectors, including quantitative risk analysis. The course will cover both theory and practice about how to evaluate transportation, procurement, supply chains and explains how to assess the environmental impact on organizations.

A choice-architecture option is to offer customers' smaller, more personalized menus will be discussed. The course will cover following: The Anchoring Effect The Scarcity Principle; Extremeness Aversion; Social Norms Further, customer acquisition through behavioral economics customers are in homeostasis, their habits are set and you're not going to move them. The course will also discuss on art of cold calling and analyzing the customers, then gradually moves over to segmentation, positioning, closing the deal, competition, marketing strategy and market expansion. The curriculum includes general basic marketing theories as well modern digital marketing issues like on boarding, conversion, and retention, experimental marketing and pivoting. The course includes a number of assignments to facilitate your learning – some of them compulsory.

The key is to think carefully just-in-time with triggers, Stubborn challenges, from the creation of jobs to the protection of the environment; role of emotion, personality, a person's irrational side, consumer reaction to behavioral economics in the marketing strategies and implementation process through Marketing information system with Integrated marketing communications need to be considered with "trade off optimal financial returns with an emotional journey they can live with : People overvalue what they have; Options distract from objectives; The power of price. Points of discussion between marketing and economics: People face trade-offs; People respond to incentives; Convince a consumer with the brand; Sales start to people willing to pay more; why consumers will wait in long lines for discounts people make trade-offs with labor, too. Discussions on Companies need to help creating their long-term strategy from a company experienced with strategy. Guerilla marketing, Ambush

marketing, Viral marketing will also be a part of entrepreneurial process. Further, Supply Chain supervision, Combinatorial Optimization; Optimization under Uncertainty; Operations Research Behavioral Operations Research; Supply Chain Execution; Geographic Information Systems; Transport Economics need to be considered to being a successful entrepreneur. The efficient procurement of goods, services and mechanism is of increased strategic importance, being a crucial element of competitiveness and financial soundness for companies and organizations should consider entrepreneurship. Successful entrepreneurship helps the economic progress of the country as they will create employment opportunity or transform a person to become proactive. Multifactor productivity helps to economic progress. Unsuccessful entrepreneurs need to get support from the policymakers so that at least they get return of their primary amount of investment. As such institutional growth need to be highly correlated to entrepreneurial growth. Diverse economic factor works for attaining entrepreneurial economy.

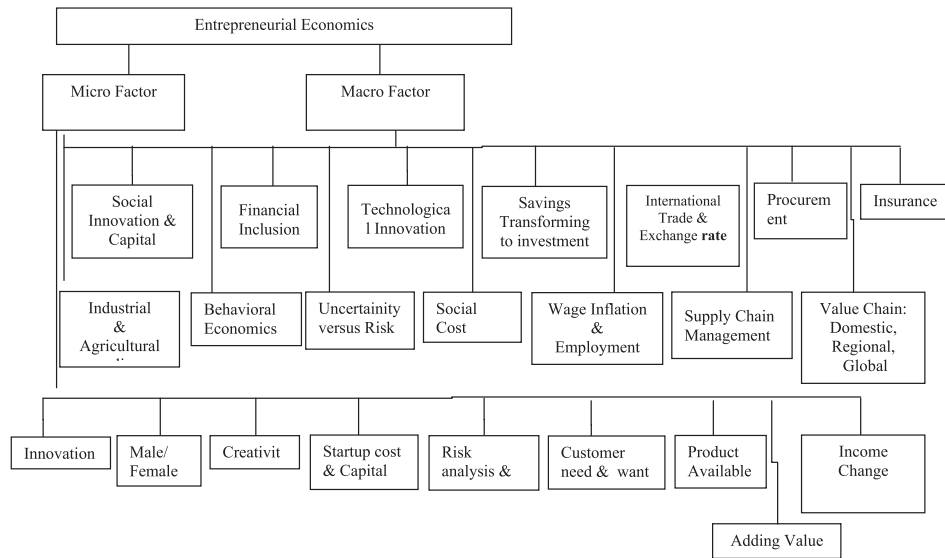
In the figure: 2, the study has been shown micro and macro factors of entrepreneurial economics. Following factors can be considered as micro factors: Innovation, male/female, creativity, startup cost and capital, customer need and want, product available, adding value and income change. Macro factors are: Social innovation and capital, financial inclusion, Technological innovation, industrial and agricultural policy, behavioral economics, uncertainty versus risk, social cost benefit, savings transforming to investment, International trade and exchange, procurement, insurance, wage inflation and employment, supply chain management, value chain-domestic, regional and global.

## **8. Conclusions and Recommendations**

The study found that Transaction charge is relatively high at bank is related to maintain of hazard in Bank insignificant. Is related to Lengthy time for application processing to Sanction of credit time is high in Bank is significant. While the study observed that Courteous behavior of the bank personnel is related to Economic factor is to attain to become an entrepreneur is significant. The study observed that Top management need for sanctioning loan (RTM) is related to Hidden cost to sanction loan is needed is significant. Also from the data collection the study found that Startup cost is the main hindrance is related to Special help for women entrepreneur is significant.

The position of technical innovation; foundations of innovation: creativity and structural creativity; interpreting creativity into innovation; kinds and designs of

Figure 2: Determinants of Entrepreneurial Economics



innovation; values fights and project supremacy; judgment of entry; novelty plans; selecting novelty schemes; teamwork plans; defensive innovation; overview to the fresh merchandise growth procedures etc. are required. Employers will pay higher wages to more educated employees, because they know that the proportion of employees with high abilities is higher among the educated ones, as it is less costly for them to acquire education than it is for employees with low abilities. For the model to work, it is not even necessary for education to have any intrinsic value if it can convey information about the employee to the employer and if the signal is costly.

Due to defaulters in the financial sector especially in the banking sector currently good and genuine borrowers are not getting loan. Those who payback timely loan repayment are not being encouraged by the banking sector due to corruption and nepotism. This actually hinders the development process of new entrepreneurs in the country.

Day (2016) rightly observed that by ability to help achieve the SDGs by 2030 will create more jobs and breakthrough innovations. Entrepreneurship is feasible through proper education and fulfill the dream of SDG's outcome. Entrepreneurship can help to attain following SDGs goal no.1,2,3,4,5,8, 9,10,11,16. As such the country need to take positive impact to achieve the SDG so that it can help as a nucleus role to enrich entrepreneurship in the country for

development of the economy through both financial sector as well as informal sector.

In case of foreign investment we should be careful otherwise multiple times of the original investment amount may be taken back by the foreigners.

Bangladesh is being used as a role model of development starting from far-flung village to towns/cities. Educational extension, controlling the rate of child mortality, provision of safe drinking water, better sewerage, economic vulnerability, good human resource development indicators, self-reliance due to increase in income flow and present activities for the improvement of environment-nature are some of the praiseworthy sides where Bangladesh has acquired achievements. As a part of the present acceleration in the country for building digital Bangladesh the young boys and girls at the root level should be given training in software, hardware and netware. By decreasing corruption honesty and justice should be ensured for all irrespective of caste-religion. Terrorism, militancy and fundamentalism should be checked with all means. For political belief or ideals the rights of any citizen should not be robbed of.

Man and women are self-confident and need driven for which they go out of their homes even in dreadful circumstances and starts building in destruction like phoenix bird. In the language of leader of the people Sheikh Hasina, 'Due to hand to mouth politics successful implementation of economics has taken place'. Even in massacre and havoc the country is advancing forward and the people will surpass all the barriers of evil mongers and politicians. Growth with equity ought to be attained through entrepreneurial economics.

Situation of the Gini coefficient ought to improve so that social justice and equitable distribution can be arranged and removing income inequality can be attained in the country. Empowerment of people may arrange the aforesaid situation to attain. Virtually to have dynamic economic situation along with people's welfare may be attained through converting collecting savings and channeling it in the investment procedure for which shall deposit can also help and as such a spate regulator is needed before establishing community banking. Multilevel marketing (MLM) companies should not be permitted to work as they are working without any legal status and doing fraud. Systematic procedure and legal status for community banking should be developed which will replace current agent banking system also. To implement sustainable development goal there is no other alternative but to creative alternative banking system in the rural areas so that poor people can not only save but also interested to invest in the local level planning process for which employment can be generated. As such

productive investment through social entrepreneurship in the rural areas and changing the structure of the rural economic dynamics is very much important to add value in the domestic and global value chain with efficiency and effectiveness. Social education is also work as an important component to come out from the vicious circle of poverty. In the financial sector corruption should be reduced so that formal sector can work to fulfill vision 2021. Mainstream economy should act for employment opportunity, to attain social justice and removing income inequality. NGOs should act to removing disparity and balanced development at the society. Govt. should come forward to establish community banking to fulfill local level planning under unit banking micro savings to transform micro investment creating micro entrepreneurship. Startups cost should be easily arranged with low cost funding and lowering interest rate in a single digit for the entrepreneurs.

The significant part of MSMEs in an economy consist of : organization of business chances; small business promotion organization, buying, industrial and financial supervision; substitute ways to entrepreneurship; backing of chances in the market setting; organization of development of the insignificant business; legal requirements which small selling must follow e-business and the entrepreneur; gathering of the business plan with the emphasis on the plan; dissimilar rudiments of the strategy, financial statement and cash flow statement; broad-based black financial enablement and chances for MSMEs. Innovation and Invention should be accompanied by proper execution of business plan which starting from nano to large entrepreneurs for which cost cutting technique should be used. Entrepreneurs need to take along innovation to prevailing manufacturing and service industries where imagination is the podium of invention. Nonetheless the aforementioned process is identically problematic to take along with groundbreaking produces in the marketplace. Even a nano entrepreneur in the country is working with disruptive technology.

Starting from risk-taking leadership and risk analysis and management - entrepreneurship should work with coherent manner. For better engagement of entrepreneurship angle investors are required so that people can have the empowerment. To support through creating employment opportunity of unbanked people through arranging financial inclusion. This will also help to attain sustainable development goals. Social welfare and grand utility will be tangent when equitable distribution can be attained by Bangladeshi entrepreneurs though creativity, social obligations and social business starting from nano, small, medium and large type of entrepreneurs. Institutions and Growth should help entrepreneurs for which presently government is trying to develop rural areas as

well as urban areas slum dwellers. Institutional funding facilities need to require for entrepreneurship is spreading out in the country. Thoughtful consideration of the strategy makers, organizers need to understand day to day operational, tactical and strategic plan for economic growing. The entrepreneurs amuse themselves noteworthy part as they contribute in the process of economic expansion of the country.

Marginalization process should be stopped and those who are involved in the pauperization process must be able include in the social welfare process. In each business school of the Bangladesh should establish business incubator for practical learning and confidence of entrepreneurship. Profit earned by the entrepreneur should be market driven. The procedure to maximize profit must be competitive one. Real rate of return should be positive. In the country where middlemen is sucking the profit system should be gradually reduced so that multiple steps of distribution channel ought to replace by the direct channel redistribution of production to distribution. Capacity buildup of the entrepreneur needs through technological progress and adoption with arranging multifactor productivity.

Nowadays education is a prime need for Entrepreneurial Economics. As such the study needs to suggest for offering Bachelor of Entrepreneurial Economics and Master of Entrepreneurial Economics from Dhaka School of Economics under University of Dhaka. Entrepreneurship education must be aligned with industry alliances.



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## Preventing Corruption in Public Service Delivery in Bangladesh

NASIRUDDIN AHMED\*

**Abstract:** *According to all major global indicators of corruption, Bangladesh is one of the most corrupt countries in the world. Using a social accountability tool, namely public hearing, this study explores the possibility of delivering corruption-free public services to citizens. The theoretical framework of the study emanates from the principal-agent theory. The findings of the study show that public service delivery is highly corrupt. The study concludes with a set of implementable recommendations for prevention of corruption in public service delivery in Bangladesh.*

### 1. Introduction

Bangladesh is a lower middle-income country with a promising and stable economy. The economy of Bangladesh continues to maintain its sustainable growth momentum with a healthy 7 percent-plus growth rate in FY 2015-16 and FY 2016-17. The head count poverty rate declined from 31.5 percent in 2010 to 23.2 percent in 2016 while the extreme poverty rate decreased from 23.2 percent in 2010 to 12.9 percent in 2016 (BBS, 2016). The inflation rate remains low. The country has moved three places up in Human Development Index 2016 (Human Development Report, 2016). The country's remarkable steady growth is possible due to a number of factors including macroeconomic stability, population control and openness of the economy. Building on its socio-economic progress achieved so far, the government has taken up multifarious initiatives to elevate Bangladesh to a knowledge-based and technology-driven middle-income country by 2021. Despite serious governance problems, the country has been making commendable progress in economic and social sectors over the last few decades, which prompt economists to talk of the Bangladesh Paradox (Khan, 2017).

\* The author works for Anti-Corruption Commission Bangladesh and BIGD, BRAC University

Empirical evidence from a number of countries shows a strong correlation between government effectiveness and the level of corruption. Highly corrupt governments usually have big problems in delivering public services, enforcing laws, and representing the public interest (Fukuyama, 2014). According to all major global indicators of corruption, Bangladesh finds itself among the most corrupt countries in the world. In Bangladesh, citizens have to travel long distances, often multiple times, incur high costs and endure considerable delays and hassle to access public services (PMO Bangladesh). The Fragile States Index 2017 depicts the dismal picture of public services in Bangladesh. Systemic corruption sufficiently undermines a state's ability to carry out its basic functions such as supplying public goods and services (IMF, 2016). 'Corruption in Service Sectors: National Household Survey 2015' of the Transparency International Bangladesh (TIB) shows that 67.8 percent households experienced corruption while receiving services from different public and private organizations.

With the above context in mind, this study attempts to explore the possibility of delivering corruption-free public services to citizens using a social accountability tool namely, public hearing. This paper highlights Article 7(1) of the Constitution of Bangladesh which stipulates that all powers in the Republic belong to the people. This study is based on the written complaints raised by 1440 citizens in 72 public hearings conducted by the Anti-Corruption Commission (ACC). These public hearings were organized in 61 upazilas of 51 districts and 5 offices in Dhaka Metropolitan area, 1 in Chittagong Metropolitan area and 5 follow-up public hearings during December 2014 to November 2017. Moreover, the study uses the output of 14 workshops conducted by the ACC in different districts during the period from November 2015 to November 2017. 840 government officials, the members of Corruption Prevention Committees, NGOs and civil society participated in the workshops.

The remainder of the paper is organized as follows. Section 2 discusses the relevant concepts and major sources of corruption. Section 3 highlights the state of corruption in Bangladesh. The international and national provisions pertaining to corruption prevention are outlined in Section 4. Section 5 delineates the theoretical framework of the study and its operationalization. Section 6 discusses social accountability tools with a focus on public hearing. The findings of public hearings are mentioned in Section 7. The concluding section (Section 8) deals with the conclusion and recommendations of the study.



## 2. Relevant Concepts and Major Sources of Corruption

### 2.1 Corruption

Corruption is the abuse of public office for private gain. Robert Klitgaard (1988) gives the following formula for corruption:  $C = M + D - A$ . That is, corruption (C) equals monopoly (M) plus discretion (D) minus accountability (A). Anti-corruption has two dimensions: (1) prevention and (2) law enforcement.

### 2.2 Vertical and Horizontal Enforcement

**Vertical enforcement** refers to enforcing laws and rules by the Anti-Corruption Commission. Anti-corruption efforts based on vertical enforcement only works if the laws and rules being enforced are supported by the relevant stakeholders, such as public service providers, businesses and civil society.

**Horizontal enforcement** only happens when the rules enable the stakeholders to be productive in their own interests. For example, the stakeholders are likely to stop interacting with rule violators, report them to the authorities, when they see these violations as damaging to their own productivity. This study underscores the need for both vertical and horizontal enforcement in anti-corruption measures.

### 2.3 Corruption Prevention

According to the Anti-Corruption Commission (ACC) Act, 2004, corruption prevention has seven dimensions (**Figure 2.1**).

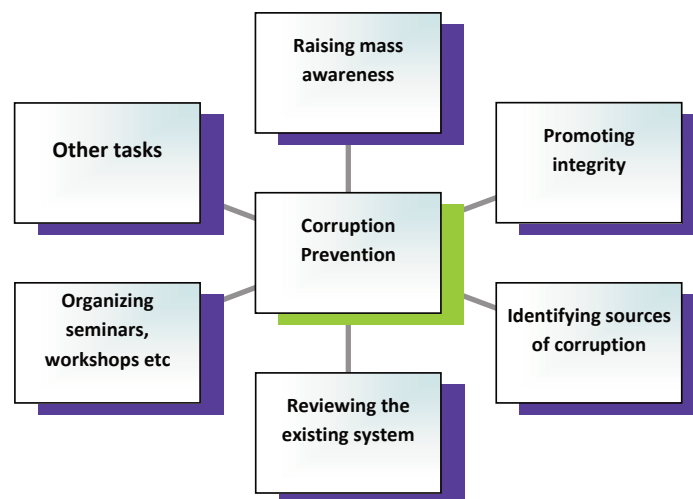


Figure 2.1: Dimensions of Corruption

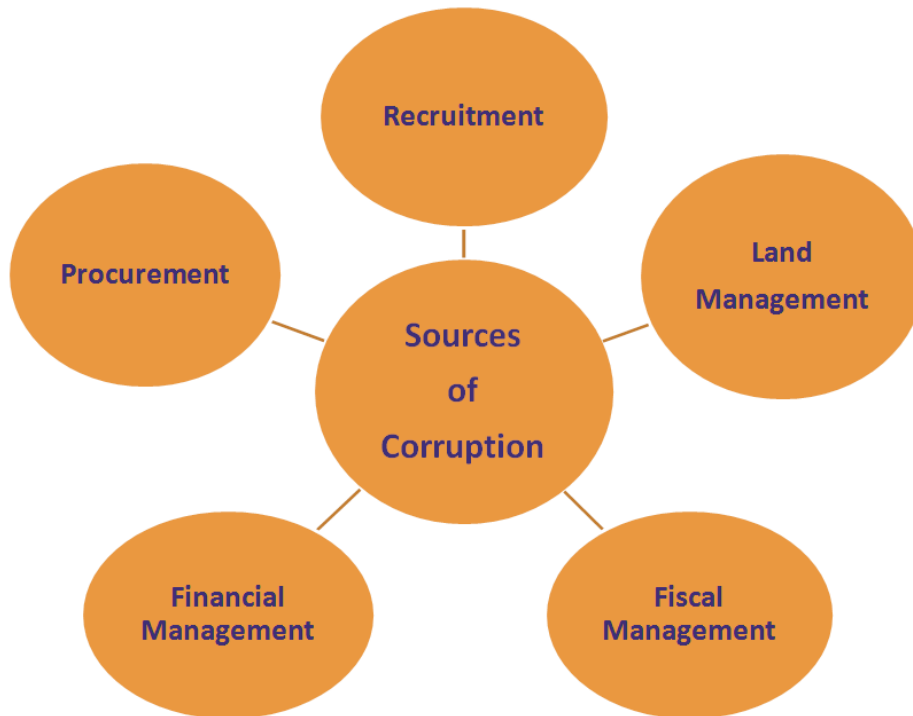


Figure 2.2: Major Sources of Corruption

### 3.4 Major Sources of Corruption

Based on the complaints received by the ACC, the major sources of corruption are given in Figure 2.2.

## 3. The State of Corruption in Bangladesh

From 2001 until 2005, Bangladesh was ranked the most corrupt country in the world by the Transparency International according to its Corruption Perception Index (CPI). Although the status started to improve after 2005, the country is still found at the bottom of the list. Three other indicators, the World Bank's Control of Corruption and the World Economic Forum's Assessment of Irregular Payments and Bribes and the Fund for Peace's Fragile States Index (Public Service), paint a similar picture.

**3.1 Corruption Perception Index (CPI):** Published by the Transparency International (TI) every year, the Corruption Perception Index (CPI) measures the

perceived level of corruption in the public sector. It has a scale of 0 to 100, 0 implying the most corrupt and 100 implying the least corrupt country.

**3.2 Control of Corruption:** It is one of the six key dimensions of governance published by the World Bank every year in its Worldwide Governance Indicators. The index measures the degree to which corruption is perceived to exist among business, public officials and politicians. Expressed in percentile rank (0 to 100), higher values indicate better governance ratings.

**3.3 Irregular Payments and Bribes:** The World Economic Forum publishes the Global Competitiveness Report each year. One of the key components of the Global Competitiveness Index (GCI) is irregular payment and bribes in (i) imports and exports, (ii) public utilities, (iii) annual tax payments, (iv) awarding of public contracts and licenses and (v) obtaining favorable judicial decisions. The value of 1 indicates very common and 7 never occur.

**3.4 Fragile States Index:** Produced by the Fund for Peace, the Fragile States Index attempts to assess the fragility of different countries using 12 composite indicators. One of the composite indicators is public service which refers to the presence of basic functions that serve the people. It has a scale of 0 to 10, 0 implying the least fragile state and 10 implying the most fragile state. The corruption status of Bangladesh in the four global indicators is given in **Table 3.1**.

*Table 3.1: Corruption Status of Bangladesh in the Four Global Indicators*

Indicator	Rank and Score
CPI 2016 (Transparency International)	26 <sup>1</sup>
Control of Corruption 2015 (World Bank)	18.27 <sup>2</sup>
Irregular Payments and Bribes 2016-17 (World Economic Forum)	3.8 <sup>3</sup>
Fragile States Index 2017 (Public Service) (Fund for Peace)	8.1 <sup>4</sup>

Sources: Relevant Websites

#### Notes

1. Scale of 0 to 100 (Higher values indicate better governance)
2. Expressed in percentile rank (0 to 100) (Higher values indicate better governance)
3. Value varies from 1 to 7 (Higher values indicate better governance)
4. Scale of 0 to 10 (Lower values indicate better governance)

Transparency International Bangladesh (TIB) conducted national household surveys on corruption perception from 1997 to 2015. According to the national household surveys, law enforcing agencies, land registration, judicial services, labour immigration and passport are perceived to be the most corrupt government departments (**Table 3.2**).

*Table 3.2: Corruption related to different services in Bangladesh from 1997 to 2015*

Year of survey published	Numbers of services/sectors in survey	Position of Corrupt Service/Sector		
		Highest	Second highest	Third highest
1997	9	Police Station	Court	Hospital
2002	8	Police Services	Health Services	Land Administration
2005	9	Land Registration	Lodging FIR in PS	Lodging General Diary in PS
2007	10	Law Enforcing Agencies	Local Govt.	Land Administration
2010	13	Judicial Services	Law Enforcing Agencies	Land Administration
2012	14	Labour Immigration	Law Enforcing Agencies	Land Administration
2015	16	Passport	Law Enforcing Agencies	Education

Source: TIB Household Surveys

#### **4. International and National Provisions Regarding Corruption Prevention**

##### **4.1 International Provisions**

###### **4.1.1 United Nations Convention against Corruption (UNCAC)**

By ratifying the UNCAC in February 2007, Bangladesh enters into an international commitment to combat corruption effectively. Articles 5 to 14 of Chapter II of the UNCAC deal with preventive measures. Some of the important Articles are enumerated below:

- Article 8: Code of conduct for public officials
- Article 9: Public procurement and management of public finances
- Article 10: Public reporting
- Article 13: Participation of society
- Article 14: Measures to prevent money-laundering

#### 4.1.2 Sustainable Development Goals

##### Goal 16: Peace, Justice and Strong Institutions

- 16.5 Substantially reduce corruption and bribery in all their forms
- 16.6 Develop effective, accountable and transparent institutions at all levels
- 16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels

#### 4.2 National Provisions

- Article 7(1) of the Constitution of Bangladesh stipulates that all powers in the Republic belong to the people.
- Section 17 of the Anti-Corruption Commission Act, 2004 has given the ACC the authority to perform any function as may be considered necessary for prevention of corruption.
- Right to Information Act, 2009 aims at ensuring the free flow of information to citizens for empowering them.
- National Integrity Strategy 2012 in its action plan gives the responsibility to the ACC to prevent corruption.
- The Seventh Five Year Plan 2016-2021 underscores the need for empowering citizens in order to achieve the objectives of the plan.
- The Five Year Strategic Plan of the ACC 2017-2021 highlights the importance of public hearings in ensuring corruption-free public service delivery.

### 5. Social Accountability

Social accountability is an approach towards building accountability that relies on civic engagement. Three main arguments underlying the importance of social accountability include improved governance, increased development

*Table 5.1: Social Accountability Tools*

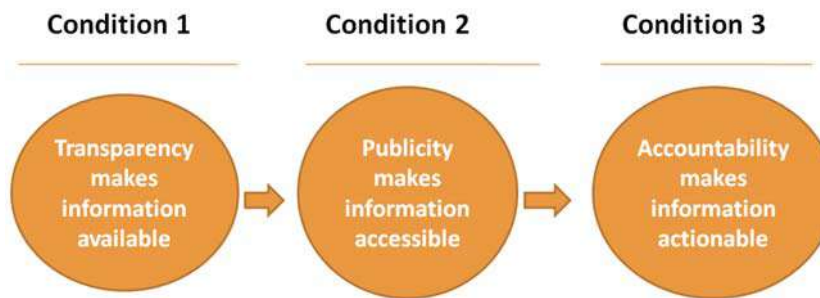
Government Function	Social Accountability Process	Social Accountability Tools
Delivery of public services	Social accountability in the monitoring and evaluation of public services	<ul style="list-style-type: none"> <li>• Access to Information</li> <li>• Citizen's Charter</li> <li>• Citizen's Report Card</li> <li>• Community Scorecards</li> <li>• Public Hearings</li> <li>• Social Audit</li> </ul>

effectiveness and empowerment, particularly of poor people. **Table 5.1** lists some tools of social accountability of which public hearing is an important one.

### **5.1 Public Hearing as a Tool of Social Accountability**

Public hearings are formal meetings at the community level where citizens express their grievances on matters of public interest to public officials who try to address their grievances. The Anti-Corruption Commission (ACC) conducts public hearings at the upazila level for ensuring the accountability of public officials and also transparency of their work. Public hearings can be thought of as a way of removing asymmetric information and thereby, empowering citizens with information, who can be expected to be in a better bargaining position than before. Second, anecdotal evidence suggests that the presence of a large number of citizens in the public hearing creates a collective pressure on public officials, who respond to the complaints raised by the citizens, and try to address their grievances. The public hearing invites public officials of a few government agencies and citizens of the same locality and allows them to question the officials directly on issues of corruption, and other hassles they face in receiving public services. The ACC organizes public hearings in collaboration with its Corruption Prevention Committees at the district and upazila levels, and Transparency International Bangladesh and development partners (World Bank and JICA). The ACC in the collaboration with Transparency International Bangladesh (TIB) conducted an information fair and public hearing for the first time in Muktagacha, Mymensingh from December 28-29, 2014. A large segment of common people attended the program. The focus of public hearings is on land management (land registration, settlement and administration), health and rural electrification. The reason for selecting these services is that these services are essential for larger sections of households and, further, the ripple effect is even more. Based on the feedback received from the public hearings, the ACC is holding dialogue with government organizations for improving service delivery through business process reengineering. Thirdly, the three key conditions for bringing accountability in public offices include transparency, which makes information available, publicity which makes information accessible and accountability which makes information actionable (**Figure 5.1**). Public hearings attempt to fulfill these key conditions for bringing accountability in public offices through citizen engagement.

Figure 5.1: Conditions for Bringing Accountability in Public



Source: World Development Report 2017

### 5.1.1 Legal Basis of Public Hearings

The Constitution of Bangladesh stipulates that a fundamental responsibility of the State is to provide basic necessities of life to citizens (Article 15). By ratifying the United Nations Convention against Corruption (UNCAC), Bangladesh has entered into an international commitment to resist corruption effectively. The Convention envisages both taking preventive measures against corruption and creating an enabling environment for ensuring integrity in conducting public affairs and managing public property in the member countries. UNCAC stipulates the participation of society in decision making process (Article 13). The National Integrity Strategy (NIS) of the Government of Bangladesh underscores the need for preventing corruption and promoting integrity. As per Section 17(k) of the Anti-Corruption Commission Act, 2004, the ACC has adopted the public hearing as a strategy for inclusive governance to monitor corruption-free public service delivery to citizens. The Cabinet Division issued a circular on 5<sup>th</sup> of June 2014 authorizing the Anti- corruption Commission to conduct public hearing for improving integrity and preventing corruption in public offices.

### 5.1.2 Organizing Public Hearings

As a social accountability tool, public hearings aim at promoting transparency and accountability of public authorities in addressing the needs of the citizens. Corruption Prevention Committees (CPCs) constituted by the Anti-Corruption Commission (ACC) at metropolitan areas, districts and upazila level organize public hearings with the support of TIB, development partners and local administration. According to the ACC policies, each district and metropolitan Corruption Prevention Committee comprises 13 members and an Upazila Corruption Prevention Committee comprises 9 members. One-third of the

members are women. One President, two Vice-Presidents and a General Secretary are nominated by the members of the committee. An adult Bangladeshi citizen is qualified to be nominated as a member of the committee for a specific jurisdiction. Any foreign national, elected public representatives, public officials, activists of any political party, any insane or bankrupt person declared by court, loan defaulters, persons accused of any criminal offence or convicted by the court is not considered to be a member of the committee. In fact, these committees consist of honest and active people from the society including teachers, religious leaders and former government officials. There are Corruption Prevention Committees in 9 metropolitan cities, 62 districts and 427 upazilas.

## **6. Theoretical Framework of the Study**

Public hearings emanate from the principal-agent theory. Here, the problem is, how do citizens (the principals) get their employees, public servants (the agents), to act in their interest? A common thread in this theory is that the government is led by a benevolent dictator, the principal, who aims to motivate government officials (agents) to act with integrity in the use of public resources (Becker, 1968, 1983, Rose-Ackerman, 1978, Klitgaard, 1988). One such view, the crime and punishment model by Gary Becker (1968), states that self-interested public officials seek out or accept bribes so long as the expected gains from corruption exceed the expected costs (detection and punishment) associated with corrupt acts. According to this view, corruption could be mitigated by (a) reducing the number of transactions over which public officials have discretion; (b) reducing the scope of gains from each transaction; (c) increasing the probability for detection; and (d) increasing the penalty for corrupt activities. Klitgaard (1988) restates this model to emphasize the unrestrained monopoly power and discretionary authority of government officials. According to him, corruption equals monopoly plus discretion minus accountability. To curtail corruption under this framework, one has to have a rules-driven government with strong internal controls and with little discretion to public officials. This model gained wide acceptance in public policy circles and served as a foundation for empirical research and policy design to combat bureaucratic or petty corruption.

Another variant of the principal-agent theory is the neo-institutional economics (NIE) approach which argues that corruption results from opportunistic behaviour of public officials as citizens are either not empowered or face high transaction costs to hold public officials accountable for their corrupt acts (Shah, 2006). The NIE treats citizens as principals and public officials as agents. The principals have bounded rationality – they act rationally based upon the incomplete information



they have. In order to have a more informed perspective on public sector operations, they face high transaction costs in acquiring and processing the information. On the other hand, agents (public officials) are better informed. This asymmetry of information allows agents to indulge in opportunistic behaviour which goes unchecked due to high transaction costs faced by the principals and inadequate countervailing institutions to enforce accountable governance. Thus corrupt countries have inadequate mechanisms for contract enforcement, weak judicial system and inadequate provision for public safety.

Corruption occurs in the public sector when an agent acts in the pursuit of his or her own self-interest at the expense of public interest. Therefore, citizen empowerment (e.g. through devolution of authority, citizen's charter, elections and other forms of civic engagement, undertaking reforms) assumes critical importance in combating corruption.

### 6.1 Operationalizing the Framework

The successful implementation of the principal-agent framework in the public sector calls for holding government officials (agents) accountable to citizens (principals). For operationalizing the framework, the study has used a social accountability tool namely, public hearing. Empirical evidence from different countries (India, Nepal, and Mongolia) shows that the public hearing has become an effective tool of providing corruption-free public services to citizens. The objective of this social accountability framework is to make service providers accountable to citizen through citizen engagement. It is argued that service delivery can be improved by enhancing the citizens' power over service providers through the social accountability framework (**Figure 6.1**).

Figure 6.1: World Development Report (WDR) Social Accountability Framework



In this framework citizens are the principals because all powers in the Republic belong to the people (Article 7(1) of the Constitution). This framework holds public officials directly accountable to citizens.

## **7. Findings of Public Hearings**

This section discusses (1) the existing corrupt public service delivery, (2) reasons for corruption, (3) case studies and (4) the effectiveness of public hearings. The findings of public hearings are summarized below:

### **7.1 Corrupt Public Service Delivery**

- Every public office is vulnerable to corruption
- System hardly works for public service delivery
- Systemic corruption prevails in public offices
- Public officials generally work for personal interest rather than public interest
- Service is a mercy, not a right
- Land management,, health, and rural electrification appear to be the most corrupt departments
- Multiple visits to government offices

### **7.2 Reasons for Corruption**

- Lengthy and cumbersome process of public service delivery
- Many intermediaries
- Controls in lieu of facilitation
- Heavy reliance on manual system
- Lack of incentives
- Too much discretionary authority
- Absence of exemplary punishment for corrupt practices

### **7.3 Case Studies**

#### **Case Study 1**

Md. Abdur Rashid Khan joined the erstwhile EPCS in 1970 and retired as an Additional Secretary to the Government in 2004. He applied for a 4.95 decimal (3 Kathas) plot of the RAJUK at Uttara, Dhaka in 1996. He got the allotment letter from the RAJUK on 31-12-2003. He made full payment in 2004. But he didn't get the possession of the allotted plot for 12 years. As a result of a public hearing organized by the ACC pertaining to the RAJUK in January 2016, Mr. Khan was able to get the possession of the allotted plot.

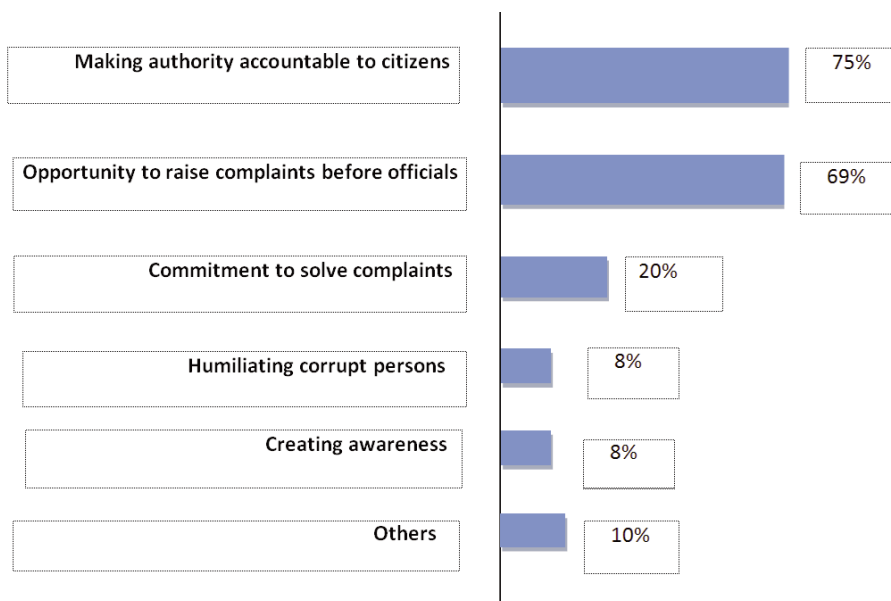
### Case Study 2

The families of twenty seven fishermen of West Chapli and Char Gangamati villages of Kolapara upazila in Patuakhali did not get their due VGF rice at the rate of 80 kg. per family allotted for them during May-June 2016. In the public hearing organized by the ACC in February 2017, one Md. Atahar Sardar of West Chapli village of Kolapara raised the issue. As a result of the intervention of the public hearing, these families received their due rice from the Dhulashar Union Parisad of Kolapara in March 2017.

### 7.4 Effectiveness of Public Hearings

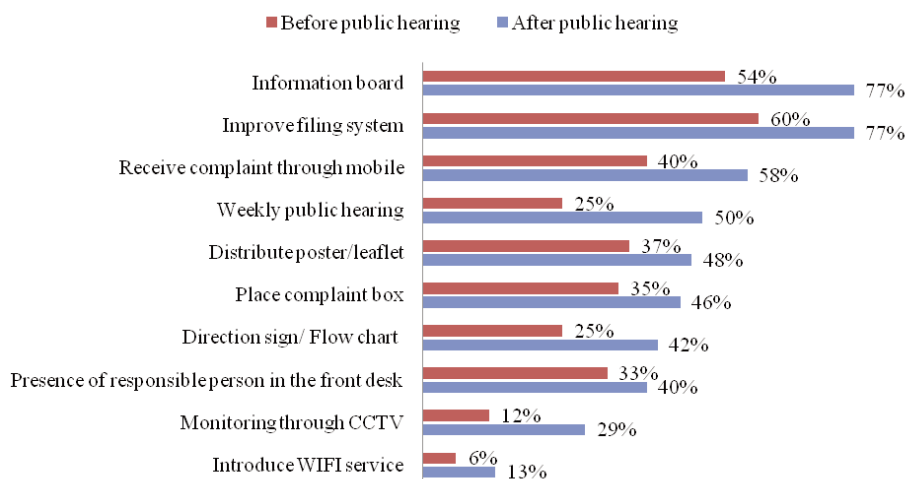
TIB (2017) conducted a study of 13 public hearings with 195 respondents. The reasons for liking public hearings was that it created opportunities for making authorities accountable to citizens (75%) followed by the opportunity to raise complaints before officials (69%) and commitment to solve complaints (20%) etc (Figure 7.1).

Figure 7.1: Strengths of Public Hearings



Source: TIB 2017

Figure 7.2: Measures Taken by Authorities after Public Hearings



Source: TIB 2017

The findings of the study also reveal that as a result of holding public hearings by the ACC, the concerned authorities have taken measures to improve public service delivery (Figure 7.2).

## 8. Conclusion and Recommendations

### 8.1 Conclusion

The ACC works to achieve the two objectives of (1) building effective citizens against corruption and (2) improving the system of public service delivery. In this regard, public hearing and its follow-up appear to be effective instrument of corruption prevention. The ACC in collaboration with the TIB has already undertaken three follow-up studies of public hearings. The results of the follow-up studies and the TIB study are encouraging. However, the challenge is to institutionalize public hearings and other social accountability tools in the system of public service delivery.

### 8.2 Recommendations

The existing corruption may be prevented if the following measures are taken:

- Establishing Help Desk in every office;
- Behaving well with every citizen;
- Placing the name, designation and mobile number of the Designated Officer (RTI Act, 2009) on the board of every office;

- Making provisions for citizens to have direct access to the Head of the Office;
- Furnishing and updating relevant information including citizen charter on websites and on the visible places at Union and Upazila levels;
- Simplifying business process for better public service delivery;
- Introducing online service delivery for bringing transparency;
- Organizing information fairs and service week to create awareness among citizens;
- Holding public hearing every week as per instruction of the Cabinet Division;
- Posting names, mobile # and photos of officers and staff of each office on billboard to free the office from middlemen;
- Making it mandatory for every official to wear office ID;
- Conducting mobile courts to bring the middlemen to justice;
- Placing at the entrance of every office the statement “Myself and my office corruption-free” signed by the Head of the office;
- Recognizing the champions of accountability in public service;
- Reducing the discretionary authority of public officials;
- Strengthening NIS Focal Points for corruption prevention;
- Developing partnerships with NGOs, civil society including media; and
- Bringing the corrupt persons to justice; and
- Conducting follow-up public hearings.

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## Corruption: Dimension and Remedial Measures Towards Development

MD. SHAMSUL AREFIN\*

### Introduction

Corruption now a day is universal. It exists in all countries, both developed and developing, in the public and private sectors, as well as in non-profit and charitable organizations. Corruption can be considered as a major obstacle in the process of economic development and in modernizing a country. Many now feel that it should receive priority attention in a country's development agenda. This greater recognition that corruption can have a serious adverse impact on development has been a cause for concern among developing countries. In a recent survey of 150 high level officials from 60 third world countries, the respondents ranked public sector corruption as the most severe obstacle confronting their development process (Gray and Kaufmann 2013). Countries in the Asia and Pacific region are also very worried about this problem and they are in substantial agreement that corruption is a major constraint that is hindering their economic, political and social development, and hence view it as a problem requiring urgent attention at the highest level. Thoughts and suggestions on possible remedial measures have also been included as it would not be a fruitful exercise to only discuss issues and problems, without coming forward with some solutions as well. The aim of the paper is to create greater awareness of the subject and to explore the potential of an economic development of a society.

### Definitions and classifications

Corruption is defined as the use of public office for private gain, or in other words, use of official position, rank or status by an office bearer for his own personal

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\* Secretary, Anti-Corruption Commission

benefit. Following from this definition, examples of corrupt behaviour would include: (a) bribery, (b) extortion, (c) fraud, (d) embezzlement, (e) nepotism, (f) appropriation of public assets and property for private use, and (h) influence hawking. In this list of corrupt behaviour, activities such as fraud and embezzlement can be undertaken by an official alone and without involvement of a second party. While others such as bribery, extortion and influence hawking involve two parties – the giver and taker in a corrupt deal. The two-party type of corruption can arise under a variety of circumstances. Often mentioned are concerned with the following:

- i. **Contracts:** bribes can influence who gets the contract, the terms of the contract, as well as terms of subcontracts when the project is implemented.
- ii. **Benefits:** bribes can influence the allocation of monetary benefits such as subsidies, social safety nets and rationed prices etc. Bribes can also be important in obtaining licenses and permits to engage in lucrative economic activities such as importing certain goods in high demand and in short supply. Moreover, bribes can be given to acquire in-kind benefits such as access to privileged schools, subsidized plot, flats etc.
- iii. **Revenue:** bribes can be used to reduce the amount of taxes, fees, dues, custom duties, and electricity and other public utility charges collected from business firms and private individuals.
- iv. **Time savings and regulatory avoidance:** bribes can speed up the granting of permission, licenses and permits to carry out activities that are perfectly legal. This is the so-called “grease money” to turn the wheels of bureaucracy more smoothly, speedily and hopefully in the most wanted direction. It is also not difficult to think of a really awful situation where rules and regulations, and the way they are applied, are so complex and burdensome that the only way left to get things done is to pay money to avoid them.
- v. **Influencing outcomes of legal and regulatory processes:** bribes can be used to provide incentives to regulatory authorities to refrain from taking action, and to look the other way, when private parties engage in activities that are in violation of existing laws, rules and regulations such as those relating to controlling pollution, preventing health hazards, or promoting public safety as in the case of building codes and traffic regulations. Similarly, bribes can be given to favour one party over another in matters relating to legal and regulatory proceedings.

The concept of economic rent (or monopoly profit) occupies a central place in the literature on the subject of corruption. Economic rent arises when a person has something unique or special in his possession. A person who owns such a special asset can charge a more than normal price for its use and earn economic rent or monopoly profit.

### **What is done? What is to be done?**

Official rules need to be properly observed, they must be transparent, that is, must be set out clearly and made known in advance to all concerned, so that they can be understood and obeyed. Apart from being clear, rules must also be applied in an impartial manner with respect to all citizens and must be consistent and not be subject to frequent and arbitrary changes.

Discretionary powers represent another key concept in discussing corruption. They arise because it is not possible to devise rules and regulations that are watertight and foolproof and will take care of all contingencies that can crop up in trying to control or direct an economic activity. Hence, some flexibility and discretionary powers will have to be given to administrators in interpreting and implementing rules.

Accountability can ensure corruption free society. The following three conditions are responsible for non- accountability:

- (i) If there is a large number of laws, rules, regulations, and administrative orders to restrict business and economic activities and thereby creates huge opportunities for generating economic rent, and especially if these restrictive measures are complex and opaque and applied in a selective, secretive, inconsistent and non-transparent way;
- (ii) If the Administrators are granted large discretionary powers with respect to interpreting rules, are given a lot of freedom to decide on how rules are to be applied, to whom and in what manner they are to be applied, are vested with powers to amend, alter, and rescind the rules, and even to supplement the rules by invoking new restrictive administrative measures and procedures; and
- (iii) If there are no effective mechanisms and institutional arrangements in the country to hold administrators accountable for their actions.

If a community has a large number of wedding receptions, birthday parties, anniversaries, celebrations, rituals, festivals, and fund raising ceremonies for all sorts of worthy causes, the financial burden of these festivities can fall heavily on

officials. In this case the general perception is that civil servants with insufficient salaries to meet the living expenses of their families are driven by necessity to engage in corrupt practices. Raising their pay, it is argued, will mean less need to depend on illegal activities to earn a living while they have more to lose if they get caught. This sounds reasonable and there are cases where countries that pay their civil servants well, tend to have less public sector corruption than in those where pay scales are low. But there is no hard evidence to suggest that low level public employees are less greedy than their superiors. The line between “need driven” and “greed driven” corruption is hard to draw and it is difficult to determine where one ends and the other begins. Thus, there are those who believe that increasing pay without other complementary measures is not likely to have a significant impact on reducing corruption. On the contrary, the cost to the government budget of paying employees more, may be much larger than the benefit that may result from reduced corruption. Moreover, when no serious efforts are made to control inflationary pressures in a country, shopkeepers will take an increase in civil servant salaries as a sign for them to raise prices. Higher pay leading to higher prices and higher costs of living mean there is no increase in the “real” wage of government employees and no improvement in their welfare.

Underground economic activities exist in all countries. They are of two types. First, there are those that are illegal such as engaging in the drug trade or the smuggling business. The second consists of those activities that are legal but are not officially recorded to evade taxes or for some other reason. Corruption gives rise to both these types of activities and contributes directly to the rise of the underground economy. Although underground economic activities exist in all countries, they become pervasive where corruption is widespread. When a large portion of an economy goes underground, official macroeconomic data which mostly cover only the formal sector, become unreliable to assess economic performance or to provide a basis for policy making and analysis.

Income distribution under a corrupt system, the privileged and the well-connected enjoy economic rent. Economic rent, by definition, represents abnormal or monopoly profits and can bestow large benefits. As such, there is a tendency for wealth to be concentrated in the hands of a tiny minority of the population. Income distribution, therefore, becomes highly uneven. In addition, the burden of corruption falls more heavily on the poor as they cannot afford to pay the required bribes to send their children to a decent school, to obtain proper health care, or to have adequate access to government provided services such as domestic water supply, electricity, sanitation and community waste disposal facilities.

Closely associated with an unequal income distribution and concentration of wealth in the hands of a few, there emerges a distorted consumption pattern aimed at meeting the lifestyle of the new and extremely rich urban elite. This involves import of a large variety of luxury goods from abroad – flashy cars, lavish home furnishings, state-of-the-art consumer durables and electronic products, fashion clothing, exotic perfumes, expensive foodstuffs, fine wines and spirits, and fancy goods of all kinds that can be found in supermarkets and department stores.

Adverse impact on investment, both domestic and foreign, is considered to be particularly harmful for a developing economy. Bribes may have to be given before any investment takes place and upon entering into negotiations for the establishment of an enterprise. More payments usually follow in the process of setting up the business. Procurement of leases for land and buildings; permission to engage in activities such as production, transport, storage, marketing, distribution, import and export; obtaining connections for water, gas, electricity, and telephone; having access to telex, fax and e-mail facilities and so on; can involve payment of substantial bribes at various stages and may require the services of agents with specialized expertise on how to get around complex rules and procedures to acquire these things. Unfortunately, these agents and middlemen, instead of being part of the solution can often become a part of the problem.

For a poorer economy, talented local business people, managers, entrepreneurs, and industrialists represent a scarce and valuable resource. Their talents should not be wasted in rent seeking activities. They should be doing productive work. Surveys have also revealed that business people have to spend a lot of management time in discussions, negotiations and waiting for appointments with bureaucrats and public officials in corrupt regimes than in countries where there is less corruption (Gray and Kaufmann 2011).

In any society, there are laws and regulations to serve social objectives and to protect the public interest, such as building codes, environmental controls, traffic laws and prudential banking regulations. Violating these laws for economic gain through corrupt means can cause serious social harm. Violating building codes through the connivance of corrupt officials and building contractors has resulted in collapse of apartment buildings, department stores and hotels in some countries. Failure to observe proper fire prevention and safety regulations has caused supermarkets, garment factory, hotels filled with shoppers and customers, workers to go up in flames. Overloaded ferries and passenger ships have sunk in seas and rivers all over the region. Paying bribes to operate un-roadworthy and poorly maintained public vehicles have led to accidents on the highways and

buses plunging down ravines and gorges due to mechanical failure are common in many countries.

Shoddy workmanship, use of substandard materials and disregard for proper design and engineering specifications, due mainly to corruption, have caused bridges to collapse and dams to burst, resulting in heavy loss of life and property. Obscure insider trading practices and financial scams that can result from poorly supervised financial systems also have serious economic and social consequences. People have lost their life savings and fortunes in financial scams.

It is a common practice in many developing countries to institute price controls and to provide essential goods and services at subsidized prices to consumers. The official price for a key food item, such as rice, is fixed by paying a low administratively set price to farmers, while gasoline, electricity and charges for public transport and other essential items are provided at low subsidized prices. These mostly benefit city dwellers as they are the main consumers of these subsidized goods and services. Fixing prices at artificially low levels lead to demand exceeding supply for the subsidized goods so that the all too familiar shortages, rationing, corruption and black markets result.

Unfortunately, corruption places severe constraints on a country's capacity to undertake economic reforms. This is because reforms require greater transparency, accountability, free and fair competition, deregulation, and reliance on market forces and private initiative, as well as limiting discretionary powers, special privileges, and price distortions – all of which will reduce opportunities for economic rent on which corruption thrives. The rich and the powerful, the main gainers of a corrupt system, will therefore oppose reforms.

“Fry some big fish”, means that is to publicly try and punish some well-known corrupt people in the country. Some highly publicized trials and convictions of important officials and businessmen on charges of corruption need to be demonstrated that the fish is fried from our own pond.

A responsible press to gather, analyze, organize, present and disseminate information is considered vital to create greater public awareness and to provide the momentum for undertaking reforms to overcome corruption.

Views on the effectiveness of anti-corruption oversight or watchdog bodies are mixed. There are instances where they have proved useful. For example, the Independent Commission Against Corruption in Hong Kong, China, and similar institutions in Botswana, Chile, Malaysia and Singapore are regarded as having done a good job.

This is a very large area and only brief mention can be made of the relevant issues. It involves such things as improving the legal framework; smoother, less time-consuming and less burdensome ways to conduct business in the functioning of law courts and in the administration of justice; promoting efficiency of the police force; strengthening the auditor general's office; and appointment of responsible and effective Commissioners empowered to investigate and prosecute corruption.

The main conclusion to be drawn is that undertaking reforms by reducing institutional weaknesses offers the best hope to overcome corruption. Corruption will not disappear because of reforms. But reforms will bring it under control and minimize its adverse consequences so that the country can proceed with its efforts to become a modern, developed nation with a good chance of attaining the SDG's.

Having looked at some of the ways in which corruption damages the social and institutional fabric of a country, we now turn to reform options open to governments to reduce corruption and mitigate its effects. Rose-Ackerman (2008) recommends a two-pronged strategy aimed at increasing the benefits of being honest and the costs of being corrupt, a sensible combination of reward and punishment as the driving force of reforms.

If public sector wages are too low, employees may find themselves under pressure to supplement their incomes in "unofficial" ways. Van Rijckeghem and Weder (2011) did some empirical work showing that in a sample of less developed countries, there is an inverse relationship between the level of public sector wages and the incidence of corruption.

Subsidies, tax exemptions, public procurement of goods and services, soft credits, extra-budgetary funds, all are elements of the various ways in which governments manage public resources. Governments collect taxes, tap the capital markets to raise money, receive foreign aid and develop mechanisms to allocate these resources to satisfy a multiplicity of needs. Some countries do this in ways that are relatively transparent and make efforts to ensure that resources will be used in the public interest. New Zealand, which is consistently one of the top performers in Transparency International's *Corruption Perceptions Index*, is a pioneer in creating transparent budget processes, having approved in 2014 the Fiscal Responsibility Act, providing a legal framework for transparent management of public resources.

The high correlation between the incidence of corruption and the extent of bureaucratic red tape as captured, for instance, by the *Doing Business* indicators suggests the desirability of eliminating as many needless regulations while safeguarding the essential regulatory functions of the state. The sorts of

regulations that are on the books of many countries—to open up a new business, to register property, to engage in international trade, and a plethora of other certifications and licenses—are sometimes not only extremely burdensome but governments have often not paused to examine whether the purpose for which they were introduced is at all relevant to the needs of the present. Rose-Ackerman (2008) suggests that “the most obvious approach is simply to eliminate laws and programs that breed corruption.”

Because in a globalized economy corruption increasingly has a cross-border dimension, the international legal framework for corruption control is a key element among the options open to governments. This framework has improved significantly over the past decade. In addition to the OECD’s Anti-Bribery Convention, in 2005 the UN Convention Against Corruption (UNCAC) entered into force, and by late 2013 had been ratified by the vast majority of its 140 signatories. The UNCAC is a promising instrument because it creates a global framework involving developed and developing nations and covers a broad range of subjects, including domestic and foreign corruption, extortion, preventive measures, anti-money laundering provisions, conflict of interest laws, means to recover illicit funds deposited by officials in offshore banks, among others. Since the UN has no enforcement powers, the effectiveness of the Convention as a tool to deter corruption will very much depend on the establishment of adequate national monitoring mechanisms to assess government compliance.

Just as public-induced distortions provide many opportunities for corruption, it is also the case that frequent, direct contact between government officials and citizens can open the way for illicit transactions. One way to address this problem is to use readily available technologies to encourage more of an arms-length relationship between officials and civil society; in this respect the Internet has been proved to be an effective tool to reduce corruption (Andersen *et al.*, 2011). In some countries the use of online platforms to facilitate the government’s interactions with civil society and the business community has been particularly successful in the areas of tax collection, public procurement, and red tape. Perhaps one of the most fertile sources of corruption in the world is associated with the purchasing activities of the state. Purchases of goods and services by the state can be sizable, in most countries somewhere between 5-10 percent of GDP. Because the awarding of contracts can involve a measure of bureaucratic discretion, and because most countries have long histories of graft, kickbacks, and collusion in public procurement, more and more countries have opted for procedures that guarantee adequate levels of openness, competition, a level playing field for suppliers, fairly clear bidding procedures, and so on.



Chile is one country that has used the latest technologies to create one of the world's most transparent public procurement systems in the world. Chile Compra was launched in 2003, and is a public electronic system for purchasing and hiring, based on an Internet platform. It has earned a worldwide reputation for excellence, transparency and efficiency. It serves companies, public organizations as well as individual citizens, and is by far the largest business-to-business site in the country, involving 850 purchasing organizations. In 2012 users completed 2.1 million purchases issuing invoices totaling US\$9.1 billion. It has also been a catalyst for the use of the Internet throughout the country.

In many of the measures discussed above aimed at combating corruption, the underlying philosophy is one of eliminating the opportunity for corruption by changing incentives, by closing off loopholes and eliminating misconceived rules that encourage corrupt behavior. But an approach that focuses solely on changing the rules and the incentives, accompanied by appropriately harsh punishment for violation of the rules, is likely to be far more effective if it is also supported by efforts to reinforcement the moral and ethical foundation of human behavior.

Possible task for policymakers could be to improve the transparency of interactions between public and public officials. That could reduce the discretionary power of officials, lower the preferential gains from corruption, and decrease both the mean and dispersion of bribery.



## Setting the Regional Standards in South Asia and SARSO

ASJADUL KIBRIA\*

**Abstract:** *A big step towards overcoming the prolonged complexity of Non-Tariff Measures (NTMs) in South Asia is the setting up of the South Asian Regional Standards Organisation (SARSO) under the umbrella of the South Asian Association for Regional Cooperation (SAARC). The regional body, based in Dhaka, went into operation in 2015. The main objective of the SARSO is to facilitate coordination and cooperation among SAARC member countries in the fields of standardisation and develop a set of harmonised regional standards. Such standards will not only help reduce the Non-Tariff Barriers (NTBs) to regional trade but also enhance global trade of the region. In the global stage, developing countries will come under more pressure from developed countries to comply with stringent standards while exporting to their markets. The regional standards can help to a great extent in dealing with such challenges. Like any other initiative, the SARSO is also facing many challenges and progressing slowly. This paper argues that all the SAARC member countries need to cooperate with each other for operating the SARSO effectively so that they can deal with the increasing global pressure.*

### I. Introduction

The low level of intra-regional trade in South Asia is a one of the most discussed topics in the region and also considered one of the major drawbacks to progression of the South Asian Association for Regional Cooperation (SAARC). While the intra-ASEAN trade was 25 per cent of the total external trade in 2015, the ratio was 5.61 per cent in the SAARC bloc. In fact, the value of intra-regional trade in SAARC declined to US\$ 46.51 billion in 2015 from US\$ 49.35 billion in

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\* Planning Editor, The Financial Express, Email: [asjadulk@gmail.com](mailto:asjadulk@gmail.com)

2014, (ITC Trade Map; August, 2016). Though the SAARC countries agreed to reduce tariffs to the zero level by establishing South Asian Free Trade Area (SAFTA) by 2016, they failed to meet the deadline on dismantling this barrier.

Again, elimination of tariff is taking place gradually as a major process of global trade liberalisation and South Asia is also not out of the liberalisation process. At the same time, Non-Tariff Measures (NTMs) are on the rise across the world and also in South Asia.

Sanitary and Phytosanitary Measures (SPS) and Technical Barriers to Trade (TBT), which are essential for protecting human health, environment, product quality and standards, constitute the largest part of NTMs in the region. SPS deals with regulations on food safety and plant and animal health. TBTs are measures taken to protect domestic markets, consumers and industries, which can indirectly discriminate against imports from other countries (Jayaram, 2016). Each country follows different standards and procedures with relation to SPS/TBT regulations, and also applies different standards to exporting countries depending on the level of hostility or ideological differences between them. While these NTMs cannot be eliminated, it is important to ensure that they are accompanied by relevant policy measures so that they do not impede trade and turned into NTBs (non-tariff barriers). Again, NTMs unfairly discriminate against exports from smaller nations with lesser capacities as they lead to high costs. On the other hand, customs duties, rules, and regulations turn out to be a major NTB (Jayaram, 2016).

Thus setting and adopting higher and stringent standards and imposing those on trade partners are some of the outcomes of rising NTMs across the world. Many of these standards appear to be trade barriers for other countries, especially developing nations. As most of the developing countries are not in a position to set or adopt higher standards due to lack of resource constraints, one possible solution is to set regional standards or harmonise the standards of the regional countries.

Jayaram (2016) rightly argued that the negative effects of NTBs can be avoided by creating a transparent system with uniform standards in the region. Standards certificates issued by the exporting country should be accepted by the importing country. Special testing laboratories must be made available in bordering areas to avoid delays. Border warehouses will help improve trade in perishable items, which constitute one-third of intra-regional trade. All countries should follow a single set of mutually-agreed customs procedures, rather than adopting an arbitrary model. Efforts must be made to build the capacity of small and medium enterprises in smaller nations to meet export standards in order to allow them to benefit from trade.

In fact, countries in a particular region have similarities in climate, culture, governmental policies, consumption, industrial production and other areas. Therefore, there might be a need for common standards. In order to deal with these regional issues in the field of standardisation, regional standards organisations are there in different regions of the world (UNIDO, 2006).

Such a regional arrangement is possible under a Regional Trading Agreement (RTA) or any regional grouping aimed at economic integration in the long-run. While RTA can help primarily to enhance intra-regional trade, a common set of trade-related standards can boost the trade by addressing the complexity of NTMs. In line with this proposition, member countries of the SAARC have decided to harmonise standards in South Asia. So, they established the South Asian Regional Standards Organisation (SARSO) in 2011.

The main objective of the SARSO is to facilitate coordination and cooperation among SAARC member countries in the field of standardisation and develop a set of harmonised regional standards. It is also presumed that such standards will not only reduce the NTBs hampering the regional trade, but also help enhancing global trade of the region. But, setting the regional standards is a daunting task and requires a lot of efforts. To make it a success, better coordination among the national standards bodies is essential. The difference in size of the national economies and trade patterns in South Asia are two big challenges the SARSO faces.

### ***Research question***

This paper has briefly examined the problems and prospects of regional standards, particularly in South Asia when the region is facing challenges to exploring its potentials of expanding its trade by joining more actively the global value chain. The basic questions this paper tries to answer here are as follows:

Is it possible to introduce and adopt a set of comprehensive regional standards in South Asia?

Will the SARSO be successful in devising the harmonisation of standards in South Asia?

### ***Data and methodology***

Mainly secondary data have been used due to the nature of this paper. Data have been collected from the government bodies and research organisations, mostly from their websites and relevant online sources. The relevant literatures used here

to get data, necessary information and views include research papers, discussion papers, reports, journals and newspaper articles. To get views of the stakeholders, rapid interactions were made with few business leaders, policymakers and experts in South Asia through email, telephone conversation and table talk. Subsequently, the data, views and interactions have been analysed along with relevant literatures to draw a conclusion.

### ***Limitation***

No attempt has been made here at any statistical or econometric exercise. It also doesn't examine the agreements and activities of the SARSO in detail.

### ***Plan of the paper***

The title of the paper is 'Setting Regional Standards in South Asia and SARSO.' It is divided into seven sections. The Section-I contains introduction which includes the research question, data and methodology, and limitation of the paper; The Section-II dwells on relevant literature review; Section-III provides a short note on standards and related things; Section-IV briefly examines the scope of regional standards in the context of South Asia; Section-V discusses challenges and prospects of SARSO in short; Section-VI summarises the findings based on discussions and analyses; and Section-VII draws a conclusion with few suggestions.

## **II. Relevant Literature**

Regional standards in South Asia are comparatively a new concept. The emergence of SARSO has generated some interest among the researchers in this regard. Few of them try to learn from other regional experiences to find some lessons for the SARSO. In one such detailed work, Cote (2016) provided suggestions for SARSO on the basis of institutional structures and experiences from relevant regional standardisation organisations as well as good practices in harmonisation of trade-related standards. His work also examined whether SAARC Members should indeed collectively adopt international trade-related standards as a form of harmonisation or rather revise their current standards for harmonisation.

Cote (2016) showed that ASEAN Consultative Committee for Standards and Quality (ACCSQ) was successful in harmonising technical regulations and conformity assessment procedures on electrical equipment as well as a Pharmaceutical Good Manufacturing Practice Mutual Recognition Agreement

(MRA). Thus, he argued that ACCSQ's experience with MRA and in developing a collaborative environment amongst Member States could be useful to SARSO also.

Focusing on African Organisation of Standardisation (ARSO), which is working to harmonise national and sub-regional standards as 'African Standards,' Cote (2016) mentioned that these harmonisation efforts were intended to facilitate trade among African countries as well as international trade. He also suggested that SARSO might be benefited by learning from ARSO's communication and information dissemination structure.

Cote (2016) also mentioned that MERCOSUR Standardisation Association, an alliance of Latin America's sub-regional bloc of five countries, developed and harmonised around 600 standards for the member countries. And these are all voluntary standards.

Cote (2016) argued that SARSO should be both the standard-taker and standard-maker in different cases. He viewed that SARSO could collaborate with member countries' organisations like Bureau of Indian Standards (BIS) 'to mobilise the development of trade-related standards, broaden its portfolio of standards, and harmonise those standards across the SAARC membership.' He has also opined that as the BIS developed more than 19,000 standards for India, many of such standards may be used as base standards for the region. Being alert on the complexity and sensitivity of the SAARC member countries in this regard, Cote (2016) concluded that whether and when SARSO and SAARC Members should adopt international standards approved by organisations such as the ISO or revise the existing national standards for regional harmonisation, must be scrutinised carefully.

The issue of regional standard is, however, not necessarily welcome always as identified by Mayeda (2004). He has observed that harmonisation is largely an inefficient tool for dealing with development issues. While it is important to develop institutional capacity in developing countries to deal with health, safety and technical standards, across the board harmonisation fails to recognise the needs for countries to adapt laws and legal institutions to domestic conditions.

Mayeda (2004) has also argued that a drive towards harmonisation restricts political sovereignty over the domestic regulations, thus by making it difficult to adopt regulatory standards in areas such as environmental protections and food, health and safety that are more restrictive than those of exporting countries. He has also mentioned that while developed countries are concerned that harmonisation will force them to adopt the lower standards of other countries,

developing countries are concerned that high standards in developed nations are barriers to developing countries' access to the international market.

Thus, as pointed out by Mayeda (2004), the cause of tension is to bridge the gap between the need for harmonisation to protect the human and natural environment and the use of harmonisation with standards in developed countries that use them as a way of disguising their protectionist measures. Another cause of tension is the desire of developed countries to adopt progressive and precautionary regulatory measures.

Mayeda (2004) has also argued that standards might be better for developing countries in the case of institutional capacity. But the cost of developing highly-specific, rule-based regulatory systems, both in terms of financial resources and economic and legal expertise, is high.

The argument that standards are ultimately trade-restrictive measures is nullified by many. Aldaz-Carroll (2006) has argued that the ultimate objective of standards and conformity assessment is to facilitate trade by protecting health, safety and the environment, and by improving productive efficiency. When these legitimate objectives are satisfied, standards serve a public goal and their removal is undesirable, since they correct a market failure.

Aldaz-Carroll (2006) has opined that transaction costs associated with differences in standards could be reduced, as a number of international standards bodies (like ISO and IEC) have elaborated international voluntary standards and are encouraging countries to harmonise their standards with these international ones.

Aldaz-Carroll (2006) has pointed out that a country can upgrade its standards unilaterally or in a coordinated manner, be it a cooperation agreement approach or an RTA approach. He has also mentioned that an RTA approach involves not only the upgrading of standards, but also the regional harmonisation of standards and a regional approach to upgrading and harmonising standards, and the conformity assessment within the context of an RTA can provide the stepping stones for greater participation in the global market.

The response of firms in the market may be an important factor in adopting harmonisation of standards. Applying econometric exercise, under a political economy model, Jørgensen and Schröder (2014) have showed that the monopolist favours a harmonisation of standards, while a duopoly firm would lobby for mutual recognition. But the duopoly firm is ready to pay higher for a regime of mutual recognition than the monopolist's willingness to pay for making harmonisation the coordination rule under Cournot competition model.



Jørgensen and Schröder (2014) have also argued that harmonised standards open the possibility for one-way trade, they may (driven by strategic interaction) result in wrong-way trade. Thus, products may shift from the highly concentrated, high price territory to the lower price higher competition territory. They concluded that the pitfalls of the international coordination of standards are more pronounced under Bertrand competition while mutual recognition is more robust in generating trade (at the extensive margin) and avoiding the welfare losses stemming from the influences of industry interests in trade policy.

### **III. A Brief Note on Standards**

Standard is a required or agreed level of quality attainment of a product or service and also a benchmark used as a measure, norm or model in comparative appraisal of products or services. According to UNIDO (2006), 'A standard is a document which provides, inter alia, requirements, rules, and guidelines, for a process, product or service. These requirements are sometimes complemented by a description of the process, products or services.' UNIDO (2006) also mentions that (a) standards are the result of a consensus and are approved by a recognised body; (b) standards aim at achieving the optimum degree of order in a given context; and (c) the process of formulating, issuing and implementing standards is called standardisation.

Thus, standard is a documentation providing rules, guidelines or characteristics of any product and production methods and has to be approved by a recognised body. Compliance with the standard can be mandatory or voluntary.

Few more concepts are also associated with the standard. These are: technical regulation, mutual recognition, conformity assessment, harmonisation and equivalence.

Technical regulation is a document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory (GIZ, 2012). There is still a debate on fine difference between standard and regulation. Some argue that technical regulations are basically mandatory standards while standards are generally voluntary in nature (GIZ, 2012).

Conformity assessment is a procedure used, directly or indirectly, to determine that relevant requirements in technical regulations or standards are fulfilled. Conformity assessment procedures include testing, certification, inspection and accreditation (GIZ, 2012).

Conformity assessment can be conducted by the suppliers, the purchasers or by an independent organisation or third party. Third party organisations are often accredited by a national accreditation body like BAB to undertake conformity assessment. They ensure that standards are being applied correctly and upon successful audits and provide certification of conformity to a specific standard.

Mutual recognition normally refers to the acceptance of certification of a partner country (Maur and Shepherd, 2011). Mutual recognition allows each country to maintain potentially different standards but requires each country to accord equal treatment to goods produced in the partner countries, even though standards might be different. So it is the formal recognition that the inspection and certification system of one country is equivalent to that of the partner country. Countries have to sign a Mutual Recognition Agreement (MRA) to make things work.

In fact, by accepting that the inspection and certification system of one country provides the same level of protection and controls in the importing country can be reduced (GIZ, 2012).

Harmonisation simply means replacing two or more rules or procedures with a single one. Nevertheless, the term can be somewhat misleading because there are degrees of harmonisation, involving rules alone, procedures alone, both rules and procedures, or even higher-level objectives only or essential requirements (Maur and Shepherd, 2011). Regarding regional trade perspective, harmonisation means the convergence of national standards toward a common set of requirements.

Harmonisation of standards can take place in two ways. One is unilateral harmonisation when one country or a group of countries simply adopt a standard prevailing in another country. The other is concerted harmonisation, where countries work together to identify a set of requirements that is acceptable to all parties. Concerted harmonisation can be a lengthy and uncertain process, requiring extensive negotiations among the parties concerning every standard under each jurisdiction. The more divergent the parties' interests and approaches to standardisation, the more difficult it is likely to be to negotiate a set of harmonised standards (Maur and Shepherd, 2011).

There are, however, a lot of complexities regarding standards. These are intertwined with technical classes of NTMs - Technical Barriers to Trade (TBT) and Sanitary and Phyto-Sanitary Measures (SPS) in the WTO law. Moreover, standard is considered a component of TBT. Mandatory standard is technical regulation under TBT while voluntary standard is simply standard under TBT.

Again, there are three types of standards in general. These are: product standard, procedural standard and management system (Maur and Shepherd, 2011). Product

standard is the most used standard which deals with the characteristics of goods or services and indicates quality, safety and fitness aspects of a product. For example, Bangladesh Standards and Testing Institution (BSTI) has set a standard of using minimum 10 per cent fruit pulp to be eligible as a fruit drink. Procedure or process standard deals with conditions under which goods are produced packaged and/or refined or services are rendered. For an instance, after meeting certain conditions for producing a fruit drink, the product's process can be termed 'toxic-free' or something like this. There are safety standards and environmental standards also.

#### **IV. Regional Standards**

Standards vary from country to country. Developed countries have much more complex, elaborate and sophisticated standards while developing and poor countries have a lot of limitations in dealing with standards. Thus, it is quite difficult for Bangladeshi manufacturers to fully comply with standards set and used in the United States (US) or in Japan.

The concept of global or international standard is also to some extent misleading. The WTO doesn't bind its members to follow any unique set of standards but compels not to apply standards in a manner which would constitute a "disguised restriction on international trade". But two agreements, TBT and SPS, of the WTO are considered comprehensive rules and guidelines for global standards and member countries have to set or develop their standards as per the WTO rules. So, any member can challenge any standard of another country if the latter doesn't follow the WTO rules on setting or imposing the standards. But this is a complex procedure.

There are several international bodies for standardisation of different products and services. These includes: International Standards Organisation (ISO) and Codex Alimentarius Commission. Codex is actually a joint initiative of the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO). Standards, however, set by these organisations are not legally binding for any country. That's why any ISO or Codex standard adopted by Bangladesh may not be accepted by India, although it is accepted by Pakistan. So, for exporting such a product from Bangladesh to India, a standard set by BIS has to be complied.

Such a problem is not unique for Bangladesh and India or for the region of South Asia. For the last 50 years, many countries and regions in the world have been facing similar problems originating from differences in standards. That's why

many of them are trying to adopt ‘regional standards’ or doing harmonisation of standards’ and ‘mutual recognition of standards.’

In fact, many regional and bilateral PTAs (preferential trade agreements) contain additional provisions related to the design and management of regional standards systems ((Maur and Shepherd, 2011).

Harmonisation or mutual recognition at the regional level is more cumbersome than at the bilateral level. Nevertheless, a regional arrangement is better as small and weaker economies can also negotiate and get time for adjustment. Countries in South Asia have also understood the necessities of regional standardisation and so they have established SARSO. Just like the need to improve public and private sector capacities for development and surveillance of, and compliance with, national regulations and standards, regional harmonisation is decisive for the competitiveness in intra- and inter-regional trade within and among the regional economic communities (GIZ, 2012).

Regional standards help the member countries reduce the barriers to intra-regional trade through harmonisation of the standards. It is, however, a very daunting task. All members of a certain regional trade bloc don’t have equal economic strength and their socio-economic structures are also different in many cases. Thus, advanced members have the opportunity to ride on others while setting standards.

The approach to develop a set of regional standards is mostly voluntary which sometimes turns legally binding for the trading partners. By developing regional standards, though the regional countries can easily deal with TBT and other related issues, these may be discriminatory to countries outside a particular trading bloc. Some countries may be unable to meet the regional standards as those are more stringent than country-specific standards. Again, some countries of the trading bloc may continue with a dual set of standards—regional one for member countries of the bloc and national one for countries outside the bloc. Again, any country of the trading bloc may impose regional standards on certain products and national standards on other products. All these can make the thing more complex (Kibria, 2016).

Nevertheless, efforts to develop and adopt regional standards are there. UNIDO (2006) identified some important regional initiatives. These are: (a) European Committee for Standardisation, (b) Pan American Standards Commission, (c) Arab Organisation for Standardisation and Metrology, (d) African Regional Organisation for Standardisation.

Founded in 1961, the European Committee for Standardization (CEN) draws up European standards and regroups 22 European institutes. CEN has published around 9,300 European standards and approved documents.

The Pan American Standards Commission (COPANT) was initiated in 1961 and acquired its present constitution in 1965. It has 34 active members including Canada, Mexico and the United States. The Commission develops all types of product standards, standardised test methods, terminology and related matters. The COPANT is headquartered in Buenos Aires, Argentina.

The Arab Organization for Standardization and Metrology (ASMO) came into existence in 1967. It has 17 members including: Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Saudi Arabia and Syria. The objective of ASMO is to unify technical terms, methods of testing, measurements and specifications of Arab states.

The African Regional Organization for Standardization (ARSO), established in 1977, is the African intergovernmental body mandated to promote standardisation activities in Africa, bearing in mind the blueprint for Africa's economic development as outlined in the Lagos Plan of Action. ARSO has developed a comprehensive programme on standardisation and related activities in Africa. It has 36 member countries including: Egypt, Ghana, Kenya, Liberia, Libya, Malawi, Mauritius, Niger, Nigeria, Senegal, South Africa, Sudan, Tanzania, Tunisia, Uganda and Zambia.

But there are two more regional standardisation initiatives. They are more relevant for SARSO. These two are: (a) Mercosur Standardisation Association (ANM) and (b) ASEAN Consultative Committee on Standards and Quality (ACCSQ).

Mercosur, a free trade bloc and customs union of five Latin American countries, was formed in 1991 comprising Argentina, Brazil, Paraguay and Uruguay. Later Venezuela joined the bloc. A good set of Mercosur regional standards helps make the regional integration successful. In 1994 Mercosur Standardisation Association (ANM) was formed. Headquartered in São Paulo, Brazil's financial capital, the body has 25 technical committees and developed around 600 standards for products and services. Though voluntary in nature, these standards have to be complied with by any firm wanting to trade within Mercosur (Kibria, 2016).

Again, ASEAN (Association of Southeast Asian Nations) has a policy guideline on standards and conformance. The 10 member countries, through the ASEAN Consultative Committee on Standards and Quality (ACCSQ), are working to

‘harmonise national standards with international standards and implement mutual recognition arrangements on conformity assessment.’ The ultimate declared goal is ‘One Standard, One Test, Accepted Everywhere’. So far, nearly 300 standards, technical specifications, requirements and guidelines have been harmonised with international one.

The experience of these regional standardisation initiatives indicates that the process is cumbersome and prolonged.

## **V. Challenges and Prospects of Sarso**

### ***Foundation***

At the Fifteenth SAARC Summit held in Colombo on 2-3 August 2008, the member states had agreed to establish the South Asian Regional Standards Organization (SARSO) and they had signed the text of the Agreement on establishment of the SARSO. All Member States ratified the Agreement on Establishment of SARSO. The agreement came into force on 25 August 2011. The body came into operation in April, 2014 with its headquarters in Dhaka.

The ultimate goals of the regional standards body are ‘to achieve and enhance coordination and cooperation among SAARC member states in the fields of standardisation and conformity assessment’ as well as ‘develop harmonised standards for the region to facilitate intra-regional trade and have access to the global market.’

### ***Structure***

There are two more agreements to make the regional standards in South Asia effective. One is: SAARC Agreement on Implementation of Regional Standards. The other is: SAARC Agreement on Multilateral Arrangement on Recognition of Conformity Assessment. All the eight member countries of the SAARC have ratified the agreements.

Six technical committees of the SARSO are now engaged in developing regional standards for different sectors. These are: committees on food and agricultural products; jute, textile and leather; building materials; electrical equipment, electronics, telecom & IT; chemical and chemical products; and conformity assessment.

### ***Common standards***

So far, 50 draft regional standards have been developed and now under consideration of the relevant technical committees. 52 more are on the anvil.

*Table 1: List of Finalised SAARC Standards*

S. No.	Standard No.	Title of Standard
1	SARS ISO 6892-1	Metallic Materials - Tensile Testing Part 1: Method of test at room temperature
2	SARS ISO 6892-2	Metallic Materials - Tensile Testing Part 2: Method of test at elevated temperature
3	SARS ISO 7438	Metallic Materials - Bend Test
4	SARS ISO 8491	Metallic Materials - Tube (in full section) – Bend Test
5	SARS ISO 8492	Metallic Materials - Tube – Flattening Test
6	SARS 0006	Biscuits-Specification
7	SARS 0007	Refined Sugar-Specification
8	SARS 0008	Code of Hygienic Practice for Dairy Industry
9	SARS 0009	Textile-Hessian – Specification
10	SARS 0010	Textile-Cotton Drill – Specification
11	SARS 0011	Textile-Cotton Twill – Specification
12	SARS 0012	Textile-Jute twine
13	SARS ISO 4833-1	Microbiology of the food chain -- Horizontal method for the enumeration of microorganisms -- Part 1: Colony count at 30 degrees C by the pour plate technique
14	SARS ISO 21527-2	Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of yeasts and moulds -- Part 2: Colony count technique in products with water activity less than or equal to 0.95
15	SARS ISO 4831	Microbiology of food and animal feeding stuffs -- Horizontal method for the detection and enumeration of coliforms -- Most probable number technique
16	SARS ISO 7251	Microbiology of food and animal feeding stuffs -- Horizontal method for the detection and enumeration of presumptive <i>Escherichia coli</i> -- Most probable number technique
17	SARS ISO 6888-1	Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of coagulase-positive staphylococci ( <i>Staphylococcus aureus</i> and other species) -- Part 1: Technique using Baird-Parker agar medium
18	SARS ISO 6579	Microbiology of food and animal feeding stuffs -- Horizontal method for the detection of <i>Salmonella</i> spp.
19	SARS CAC /GL 030	Principles and Guidelines for the conduct of Microbiological Risk Assessment
20	SARS CAC/GL 21	Principles for the Establishment and Application of Microbiological Criteria for Foods

But the most significant progress so far made is finalisation of seven SAARC standards. Of these, six are specifications for: Refined Sugar, Biscuits, Hessian, Cotton Twill, Cotton Drill and Jute Twine. The remaining one is the code of hygienic practices on Dairy products. Moreover, SARSO has also adopted some 13 international standards as SAARC standards. (Table-1)

Of these, only three have been approved by the governing board of the SARSO. These are: Biscuits-Specification (SARS 0006), Refined Sugar-Specification (SARS 0007) and Code of Hygienic Practice for Dairy Industry (SARS 0008). Nine more standards will be finalised soon after some refinement as per decision of the technical management board.

Any SARSO-defined standard has to be formally endorsed or ratified by all the countries. Besides this, the member countries have to develop their own capacities to deal with standards and related issues, especially TBT and SPS measures. Member countries will, however, get some time to adopt the SAARC standards by replacing the existing national standards. National standards bodies of the countries will be responsible for adaptation and implementation of the SAARC standards.

Finally, as is the case with all other SAARC initiatives, here also it is the political will of the member countries that can ultimately help produce a set of South Asian standards. Standards have become more and more important in the global trade. The surge of mega regional trade deals like TPP (Trans-Pacific Partnership) will not only subdue the multilateral trade regime as well as liberal standards, but also force others to go for stringent standards. Though US President Donald Trump withdrew his country from the TPP in the first week of his office, the essence of the deal is not killed at all (Sharma, 2017).

### ***Challenges***

Like any other initiative, the SARSO is also facing huge challenges and moving slowly.

The most challenging part of the SAARC standards is harmonisation of the existing standards and regulations. When there is a difference between a standard and a regulation, generally the regulation prevails as it is legally binding for any country. Thus, if any SAARC standard doesn't match a regulation of a member country, the country may not accept the SAARC standard. Although careful review of existing standards and regulations has been done by the sectoral technical committees before formulating or harmonising any standard, the possibility of any problem like this cannot be written off fully.



In the EU, there is a general regulation which mentions that standards have to be followed by the member countries. Thus, there is no problem with the difference between a particular standard and a regulation.

In a bid to deal with the higher standards of the developed countries, the SARSO tries to adjust the SAARC standards with that level by harmonising them with the international standards set by International Standards Organisation (ISO) or adopting ISO standards. For example, the SARSO STC on Building Materials adopts five ISO standards as SAARC standards. One of these is: ISO 6892-1:2009(E) which defines the method of test in room temperature under tensile testing of metallic materials. This standard is codified as SARS ISO 6892-1:2014.

Again, SARSO is not authorised to implement any standard. To put it simply, the SARSO initiative is harmonisation of standards among the countries and provide a framework. It is the jurisdiction of the member countries to adopt and implement. So the major challenge lies here, as adopting regional standards by the member countries requires some legal procedures of these countries.

To adopt and implement the regional standards, the related SARSO implementation agreement has clear guidelines. The article-4 of the agreement requires the member countries to adopt SAARC standards, if available, while preparing a new standard or revising a current standard. It also compels the member countries to ensure that they would not modify any national standard in such a way that it becomes more stringent than the corresponding SAARC Standard creating technical barriers to trade. Moreover, the national standards that differ from the SAARC Standards should not be more restrictive than necessary to fulfil legitimate objectives. Again, the article-5 of the agreement outlines 10-point obligations on implementation of regional standards. The Paragraph 5.8 mentions: "Approval of a SAARC Standard implies that Member States have an obligation to give it the status of a National Standard."

Another big challenge to implementation of SAARC standards is the lack of capacity in most of the member countries. Currently, only four member countries (Bangladesh, India, Pakistan and Sri Lanka) have accreditation boards. So, laboratories of these countries are not accredited by their national accreditation body. So, testing or standard certifications of these laboratories are also not accepted by other countries in many cases. Laboratories of the countries like Nepal and Bhutan are now getting accreditation from other countries, mostly from India. However, accreditation of laboratories from other countries is helpful as the country of the accreditation body finds it more comfortable while importing from a second country where the laboratories are accredited by the first country's accreditation body.

It is to be noted that accreditation is a third party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out the tasks of conformity assessment. Accreditation is made available to different conformity assessment bodies, namely Testing & Calibration Laboratories, Certification Bodies, Inspection Bodies, Training Institutions and Persons who perform conformity assessments. It is a process in which certification of competency, authority, or credibility is presented. This ensures one certificate acceptable all over the world (BAB, 2017).

Organisations that issue credentials or certify third parties against official standards are themselves formally accredited by accreditation bodies; hence they are sometimes known as ‘accredited certification bodies’. The accreditation process ensures that their certification practices are acceptable, typically meaning that they are competent to test and certify third parties, behave ethically, and employ suitable quality assurance.

One example of accreditation is the accreditation of testing laboratories and certification specialists that are permitted to issue official certificates of compliance with established standards, such as physical, chemical, forensic, quality, and security standards.

## **VI. Findings**

The experience of dealing with other regional standards as well as the initial work of the SARSO indicate that it is possible to adopt or introduce a set of comprehensive regional standards in South Asia. The paper also finds that the SARSO can be quite effective in advancing the cause of harmonisation of standards in South Asia. In fact, harmonisation is instrumental to introduction of a set of common regional standards.

But, this paper also finds that setting and adopting common standards in South Asia will not be an easy task, mainly due to the lack of capacity of most of the national standards bodies. The varied sizes of the economies also appear as a barrier to adopting the regional standards. Moreover, the political differences and the lack of mutual trusts, especially among the two big members of the SAARC—India and Pakistan—have already posed a big threat to the future of the bloc as well as the future of the SARSO.

The major findings of the paper are outlined as follows:

The relevance and importance of SAARC common standards or regional standards in South Asia as well as SARSO are still not fully recognised by all the member countries of the grouping and the stakeholders. In fact, there is not that much

Box-1: The national standards bodies of the SAARC member countries who are also the National Member Bodies of the SARSO

**ANSA**

Afghan National Standard Authority

[Established in 2015. Functioning under the Ministry of Commerce and Industries]

<http://ansa.gov.af>

**BSTI**

Bangladesh Standards and Testing Institution

*National Standards body of Bangladesh*

[Initially established as The Central Testing Laboratory (CTL) in 1956. Restructured and became a full-flagged standard body in 1985. Functioning under the Ministry of Industries.

<http://www.bsti.gov.bd>

**BSB**

Bhutan Standards Bureau

[Established in 2010.]

[www.bsb.gov.bt](http://www.bsb.gov.bt)

**BIS**

Bureau of Indian Standards

*The National Standards Body of India*

[Established as the Indian Standards Institution (ISI) in 1947 and turned into BIS in 1987.]

<http://www.bis.org.in>

**MSMU**

Maldives Standards and Metrology Centre

[Functioning under the Ministry of Economic Development and Trade]

<http://www.standards.gov.mv>

**NBSM**

Nepal Bureau of Standards & Metrology

(Established in 1976 as Nepal Institute of Standards (NIS). Renamed and restructured as NBSM in 1981. Functioning under the Ministry of Industry )

<http://nbsm.gov.np>

**PSQCA**

Pakistan Standards & Quality Control Authority

*National Standards Body (NSB) for Pakistan*

[Established in 1996 under the Ministry of Science & Technology]

<http://www.psqca.com.pk>

**SLSI**

Sri Lanka Standards Institution (1964)

*National Standards Body of Sri Lanka*

[Established as Bureau of Ceylon Standards in 1964. replaced by the Sri Lanka Standards Institution in 1984]

<http://www.slsi.lk>

awareness about the SARSO among the trade bodies and business associations in South Asia and so they are yet to establish a link with the regional body.

Most of the national standards bodies in South Asia are still not well equipped to deal with the complexity of standards and regulations. They are also not proactive to coordinate the SARSO work.

SARSO has a shortage of manpower and logistic support. Due to resource constraints, the SARSO is unable to reach out to the relevant stakeholders to popularise its mandate and let them know how beneficial it could be to foster regional trade.

SARSO needs a much more political push than what it is experiencing now. Without strong political efforts, the SARSO can't move ahead.

## **VII. Conclusion**

Regional standards in South Asia will aid the endeavour of SAARC countries to achieve higher standards of their products and services, which are becoming crucial to a better market access to the rest of the world. Regional standards will ultimately lessen the need for bilateral harmonisation of the standards and also reduce the cost of doing business. A comprehensive set of SAARC standards will also help the countries deal with the much-talked-about NTMs in a coordinated manner.

Moreover, developed countries are gradually adopting and setting higher and stringent standards. The mega-regional RTAs are designed to redefine the current multilateral trade regime and proposed to widen their coverage of areas which are not currently dealt with under the WTO framework. So, the 'WTO-plus' or 'WTO-extra' rules are emerging. One of the 'WTO-plus' concern is the mega-RTA rules on SPS and TBT which will increase the number of standards. As voluntary standards have already started guiding purchase decisions on value chains and consumer preference in developed countries, it will ultimately affect the developing countries and LDCs. There are two alternatives to deal with the situation. Either the countries have to challenge the arbitrary nature of the standards setting, or they may take it as an opportunity to upgrade their own trade-related standards (CUTS, 2015). While the first option is unlikely to yield any effective result, the second option seems more reasonable. As upgrading the standards for each country is time-consuming and costly, following the regional approach to setting common standards will be helpful. The SAARC countries can offset the de facto discrimination arising from the WTO-plus standards by entering mutual recognition agreements (MRAs) among themselves first, and then with the trading partners of the mega-RTAs. Thus, the SAARC countries should extend their support to the SARSO to make it a success.

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## Enabling Quality and Standard Infrastructure in Bangladesh: A Case of Bangladesh India Trade

Ferdaus Ara Begum\*

### 1. Introduction

With gradual decay of tariff barriers, non tariff barriers (NTBs) are taking a mammoth role while entrepreneurs get ready to export products. Technical regulations, conformity assessment standards of the importing countries are to be known clearly to have a quality pass mark to the manufacturing and processes of a specific product. The countries, as per WTO rules are allowed to protect their human, animal, plant lives and health from pests and disease by putting a reasonable standard without discriminating or inhibiting as a barriers for others and maintaining a national treatment. Enabling quality and standard infrastructure plays a supportive role for the exporters. The nature, types of certification, testing requirements, standards are diversified and continuously changing. In this thread, it is of course true that standard setting exercises are to be driven by the industries while government has to play a neutral role, a total standard eco system is the result of a collaborative efforts of both public and private sector bodies, instruments and intuitions. Has there any such collaborative approach in the country so that exporters are fully prepared with all related information of regulatory environment of the importing country, standard related issues, procedural bottlenecks, privately accepted standards and other necessary requirements etc.

While Bangladesh economy is doing good in terms of GDP growth, per capita income and poverty alleviation, export diversification remains a botch area for long. As Bangladesh economy is transiting from one phase to another, there is an urgent need to set priorities where standards setting issues would need to be

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\* CEO, BUILD E-mail: [ceo@buildbd.org](mailto:ceo@buildbd.org)

looked into with utmost importance. India recently has been working to bring changes in their trade policy to meet USD 900 billion export by 2020. Bangladesh as one of the important SAARC countries has targeted to export \$54 billion by 2020 as per its 7<sup>th</sup> Five Year Plan against USD 82 billion by 2021 as per its Perspective Plan (2010-2021). India's export target is more than 11 times than that of Bangladesh.

With the emerging new changes in the global economy, rise of protectionism, uncertainty in the mega trade blocks, risks of changing globalization pattern, and fall in the global aggregate demand in the international level we need to be serious in formulating national policies. In the national front, deep fall in export income and remittances, increase in imports and continuously changing tax policies, Bangladesh would need to think seriously for its trade policy synchronization. Bangladeshi exports are heavily concentrated in a very few markets and a few products, a single-product export RMG is the main hope. Bangladesh needs to realign its trade policies both at home and international level with the new changes.

Along with the need for reformed trade policy to cope with the new changes, there is an immense requirement for export market to be demand driven instead of supply driven. Exporters need to understand the need of the market willing to enter. Bangladeshi products are exporting into some developed countries where average tariffs are going down from 1-2%, but *advalorem* equivalence implications of Technical Regulations is about 11%<sup>1</sup>. Unless products are fully ready to meet these Technical Regulations it is impossible to capture a new market with a new product. Technical Regulations are mandatory standards which are set by the government of a country, but there are Conformity Assessment (CA) standards which are to be taken as a priority. CA refers to control, inspection, testing and certificate approval procedures maintained by the importing countries before giving permission for an entry of a product into the country as they like to safeguard the health and safety of the consumers.

Technical requirements define a product characteristic, technical specifications of a set of a product or production process while testing is the determination of one or more of an object or product's characteristics performed by a laboratory. Certification is the provision by an independent body of a written assurance while inspection describes regular checking of a product to make sure it meets specified criteria. In order to meet the requirements of the above a country sets its

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<sup>1</sup>. Mr Pandey, Joint Secretary, Department of Commerce, Government of India



Standards infrastructure. Along with these, there are some procedural obstacles as can work as an impediment for exports. An exporter has to be aware of all these issues before preparing for exporting a product into a market. There remains always huge information and knowledge gaps, as responsibilities of government organization, private sector stakeholders, laboratories, inspecting and accrediting agencies and many other related organizations and institutions are not properly transported. BUILD in association with Confederation of Indian Industry (CII) and USAID initiated a research to address Conformity Assessment standard related issues usually known as non-tariff barriers and identified six sectors that have bigger exports to India and also faced standards-related challenges, the products are; Textiles, Jute and Jute products, Plastics, Leather and Agro and Agro- processing products, Fisheries and Marine. The products are taken considering its export potential in the market of India and present trends of exports. It seems that there are demands on these products in the Indian market provided it caters to the need of the standards requirement of the market.

## **2.0 Export of these products to India<sup>2</sup>**

### **Export of Ready Made Garments (RMG)<sup>3</sup>**

In year 2016, Bangladesh exported RMG goods worth \$140.35 million to India among which \$101.68 million comprised of Woven garments and \$38.68 million was Knitwear. The figure shows a consecutive decline in the growth of export of these sectors.

### **Export of Leather and Leather Goods<sup>4,5</sup>**

Leather and Leather Goods is another promising sector showing upward growth trend, according to Export Promotion Bureau (EPB) Bangladesh earned total \$851.33 million from leather Export in July-March, 2015-16. The sector is willing to reach to the level of USD 1 billion, but export to India is a minimal even though showing slightly an increasing trend.

### **Export of Agro-Agro-processed products<sup>6</sup>**

Bangladesh's export of agro and agro-processed products to India (million US\$)

Growth of agro and agro processing product is negative, if this trend continuous

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2. Export of five priority products to India by Dr Selim Raihan, Professor of Economics, Dhaka University and Executive Director, SANEM.

3. Data Source ITC Trade Map

4. Data Source –ITC Trade Map

5. Data Source-ITC Trade Map

6. ITC Trade Map

## Bangladesh's export of RMG to India (million US\$)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	1.33	1.13	1.18	2.43	4.09	6.46	16.06	41.83	53.65	86.65	112.27	132.65
Growth (%)		-15.00	4.41	105.41	68.44	57.90	148.55	160.41	28.24	61.52	29.57	18.15

## Bangladesh's export of leather and leather goods to India (million US\$)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	0.86	1.08	1.31	0.82	1.37	0.89	1.99	0.76	2.14	3.87	11.28	13.95
Growth (%)		26.05	21.41	-37.48	67.40	-35.16	123.62	-61.92	182.17	81.18	191.47	23.65

## Bangladesh's export of agro and agro-processed products to India (million US\$)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	12.64	15.01	31.85	24.81	60.18	34.51	69.34	155.29	132.47	131.11	113.62	79.67
Growth (%)		18.78	112.19	-22.10	142.53	-42.65	100.93	123.95	-14.69	-1.03	-13.34	-29.88

*Bangladesh's export of plastic products to India (million US\$)*

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	1.17	1.84	1.51	1.05	2.14	2.40	3.97	6.62	7.31	5.33	9.10	9.35
Growth (%)		57.23	-17.79	-30.77	104.78	12.09	65.31	66.89	10.42	-27.10	70.72	2.71

*Bangladesh's export of jute and jute goods to India (million US\$)*

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	19.69	16.85	50.16	49.76	26.20	59.35	76.31	137.70	123.34	99.77	83.66	128.98
Growth (%)		-14.43	197.73	-0.81	-47.35	126.53	28.58	80.45	-10.43	-19.11	-16.15	54.17

it would risks for the country, there is a need also to find out reasons why this declining trend continuous.

### **Export of Plastic Products**

Plastic products shows a slightly increasing trend but amount is very insignificant

### **Export of Jute and Jute Goods<sup>7</sup>**

The total export of these 5 products was USD 235.62 million in 2015 which was about 45% of the total export to India, which was USD 527.6 million in this year. The standard and quality infrastructure of food and non-food items are very much different in nature, as people consider food products as very sensitive for the need of the health and human being.

## **3.0 The Research and Organization of Workshops**

BUILD in collaboration with USAID organized its first workshop on Non-Tariff Barriers in Dhaka in December 2016. After having a research and the workshop held in Dhaka, it was found that among the nontariff barriers, rules of origin, antidumping, conformity assessment and trade facilitation contributes significantly and in spite of addressing these issues appropriately it is difficult to increase trade between Bangladesh and India.

### **3.1 Findings of the 1st Dialogue**

Some of the findings of the 1<sup>st</sup> Dialogue from the points of views of Bangladeshi stakeholders are as follows:

### **3.2 2<sup>nd</sup> Dialogue on Conformity Standard**

It was mooted that in order to understand the Conformity assessment issues correctly, there is a need for a close dialogue between the importers and exporters of the country and also the policy makers and professional and support service providers to have a detailed dialogue in this regard.

2<sup>nd</sup> Dialogue Workshop on Conformity Standards was held in New Delhi, the primary objective of this workshop was to sensitize Bangladeshi private sector members and relevant government officials about the various standards and technical requirements, such as sanitary and phytosanitary measures (SPS),

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<sup>7</sup> ITC Trade Map

Express Shipment Courier (1st dialogue<sup>8</sup>)

- Set and respect de minimis duty threshold per WCO agreements
- The cost of collecting duties should not be greater than the revenues derived from the duty collection;
- Study the elasticity of demand related to the anticipated decline landed price as well as the likely Input or government revenue and broader economic activities;
- Increase penetration of credit cards for expansion of e-commerce.
- Benapole-Petrapole does not have an express facility. Courier cannot clear the shipment. In 2009, DHL tried express shipment, but failed because countries at the border has no express lane/processing -NBR's understanding in that respect is not clear.
- Poor understanding within the private sector about express courier and its economic importance.
- In order to make the trade as a legal as possible, detention, demurrage and pilferage should be stopped immediately. Otherwise the customers have to bear extra costs. Pilferage is occurring due to customs delays. The use of the term legal above implies that these extra charges should be stopped in order to regularize legal, above-board trade through the border crossing. Otherwise, illegal activities will continue – e.g., informal payments and whatever else is going on.
- Loading and un-loading time is enormous and depends on the desire of the customs.
- Tk 1500 per consignment as holiday charge, which must be stopped at once, as we are exporting 150 trucks of goods to Petrapole, India on Sunday, where we are not required to pay any holiday charge though the same day is also a holiday in India.
- If anybody is unable to unload the trucks within 48 hours, it is required to pay to LPA (Land Port Authority) an amount of Tk 2500 as demurrage charge per truck, Shipping agent an amount of USD 8000 per day if the goods are not unloaded within a fixed time. So introduction of private warehouses at Benapole like those that exist at Chittagong port could be an answer.
- Under the agreement of BBIN, several vehicles carrying passengers and goods will directly move between Bangladesh and India as well as with the introduction of dual rail line between Mongla-Khulna-Jessore. Then it will be easier for the Indian business people and Bangladesh can earn a transit fee.
- There is no BSTI branch office at Benapole port. BSTI takes so much of time for providing a report. In this situation, who will pay port demurrage and extra bank interest for the long delay? That is why a private sector lab in Benapole is an urgent need. BSTI is a great non-tariff barrier. Corrective measures be taken through a public private partnership.
- There is a huge backlog of trucks because of processing them, release times averaged 7.76 days and ranged between a low of 6 days and a high of 10 days.

<sup>8</sup>. Trip Report, AMEG-IPEC Phase III: Development of Express Shipments Pilot lueprint

Technical Barriers to Trade (TBT) applied by India to goods being imported from Bangladesh. Complying with these requirements is necessary if Bangladeshi exporters want to expand their space in the Indian market.

In total about 70 private and public sector participants of India and Bangladesh including policy makers, researchers, professionals, private business entrepreneurs put forward their opinions on how to resolve the operational and understanding gaps between these two countries. There is a perceived understanding that Bangladeshi products are discriminated in the borders in terms of testing and conformity standards which of course needs documentary evidence as was viewed in the Dialogue program. The event was facilitated by the trainers<sup>9</sup> who have expertise in conformity assessment/standards and cover all the vital aspects of how Bangladeshi exporters can comply with the Indian Standards regime. Bangladeshi and Indian participants have identified some specific areas in which they can continue to work together to address standards issues after the workshop. Some of the areas are; labeling for the non food sectors, nature of voluntary standards and mandatory standards and how to deal with these issues, counter freight manufacturing items and enforcement of laws in that respect, sample import, foreign manufacturing certificate, harmonization with Codex standards in the food sector exports, capacities of laboratories maintained by different ministries, collaboration with Food and Safety Authority of India (FSSAI) and of Food Safety authority of Bangladesh for Equivalence in regard to food safety, organic food standards etc. An appropriate action with time-bound implementation deadlines is one of the answers but for that concerned organization need to play a vital role.

The idea of this workshop grew out of multiple consultations which took place between India and Bangladesh in regard to address the trade gaps. India can play a role as a future standard setter, especially in South Asia. Opportunities for engaging in greater investment and trade. The partnership between the two countries can be strengthened by establishing a platform of mutual understanding about the conformity assessment, standard and regional growth.

There is a serious need of trust building between the two countries which comes from the fair play of trade, observed by the joint Secretary, Department of Commerce, Government of India. Underlining the commonalities of language and culture between India and Bangladesh, there is reason why they cannot also prosper as common markets, he viewed. In case of capacity building there are some emerged ideas and joint initiatives are required.

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<sup>9</sup>. In the reference section some names have been given

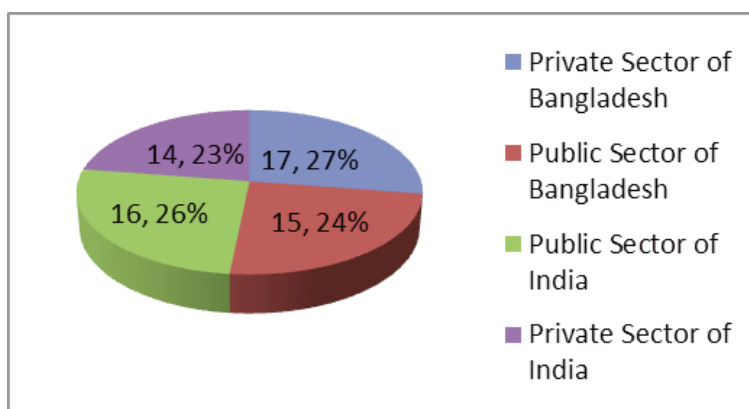
### 3.3 The participants

The aim of the workshop was to identify ways to reduce the barriers to trade not to reduce this trade gap between two countries also sensitizing Indian importers and Bangladeshi exporters (and associated government officials) about the applicable technical requirements, standards, and sanitary and phytosanitary measures that impact the flow of goods and services into India from Bangladesh. Such understanding is crucial for any cross-border trade to successfully reach Indian markets. If these barriers are taken away, trade between two countries can increase which is presently heavily balanced in favour of India.

The Dialogue brought together policymakers, regulators and representatives of standards, accreditation and conformity assessment bodies from India and Bangladesh in an open and constructive atmosphere. This workshop gave the participants an opportunity to share their experiences with standards and conformity requirements and exchange views on orientations for good practice that bolsters open markets. Confederation of Indian Industry (CII) was the counterpart of BUILD, worked under the Asia & Middle East Economic Growth Best Practices (AMEG) project of USAID.

### 3.4 Identifying issues for the respective sectors

Among the identified issues, non-acceptance of test certificates, strict labeling, certification requirements and some procedural obstacles. The question to be addressed was whether Bangladeshi exporters face problems conforming to these standards. Also, if they find any discrepancies in conformity assessment on the Indian side. Regarding standards capabilities in terms of international versus national standards is another issue which depends on the capacity and



infrastructure building by setting up testing labs and smoothening the certification process. A significant proportion of Bangladesh-India trade are being done through land ports, there are infrastructural gaps in these ports in both sides. Exporters requested for testing labs in the proximity so that samples are not required to be sent far adding costs. However, amount of goods required for tests are not huge, may not offset the need for establishment of a lab and its maintaining costs. Some sectoral issues are given below:

### **Problems of Jute Sector<sup>10</sup>**

Among the conformity Issues in the jute sector, labeling and marking tops the most, compulsory labeling drives up the transaction cost. While there is no real problem with doing this as it acts as branding for Bangladeshi products. However, Indian exporters who use Bangladeshi sacking bags prefer not to have the labels as they use them for exporting Indian products abroad. Issues regarding Rules of Origin is another concern. There are buyer standards in jute products. While there is no issue as regards to quality, there is an issue regarding quantity and pricing. Indian domestic producers have the advantage in this area as they use machine production rather than handloom production. This makes diversified Bangladeshi jute products uncompetitive in the Indian market despite being highly competitive in foreign markets. There is rejection of products at the end-buyer stage due to issues regarding licensing. There is also need for higher information dissemination amongst Bangladeshi producers in terms of the necessary Indian standards. There are some tariff-based issues also, recently Bangladesh has been facing an Antidumping on several Jute Goods making the situation worse, some discussion is going on to address Jute goods issues, while some exporters by this time have dropped the idea of exporting jute goods to India.

There are some general issues other than standards and conformity assessment needs. While there is enough export of raw jute, there is barely any of diversified jute products from Bangladesh to India. The reason identified was that Indian processed jute products are cheaper as there is mechanized production. Most of Bangladeshi processed production is, however, hand-made, and therefore costs more making them non-competitive in the Indian market. There is transfer of technical know-how from Indian to Bangladesh in the RMG and other sectors, this does not happen in the jute sector. Loading and unloading takes longer at the Indian borders which drives up transaction costs.

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<sup>10</sup>. Reports of CII on Dialogue Workshop on Conformity Standards, 25 May, New Delhi, India



### **Textile and Readymade Garments (RMG)**

Readymade garments account for a significant proportion of India's total imports from Bangladesh. While the large Bangladeshi enterprises export mainly to the US and the European Union, the small and medium one's export to India<sup>11</sup>. Readymade garments account for a huge share of 80 percent of Bangladesh's total annual exports. Some SMEs are exporting RMG products to India, there are issue like non-payment by Indian buyers, e.g.; specific case of Lilliput has distorted the confidence<sup>12</sup>. Sale of counterfeits of Indian brand products by Bangladeshi manufacturers (Raymond) is another example. In regard to tariff issues there are examples of countervailing duties on cotton, viewed as a non tariff barriers hampering growth.

### **Leather & Plastic**

There is a common perception that tests of consignments from Bangladesh happen more often. This may decrease exporter confidence. Health Certification requirements cause delays. It appears that there is mandatory testing of goods. In regard to certification requirements there is lack of information at the ports about recognized certificates based on MRA's. There are not enough certified labs closer to the Bangladesh – India border than Kolkata. This increases transaction costs due to conformity requirements acting as a non-tariff barrier to trade. No clarity on the requirement for SGS certification from the states even though it is not a buyer requirement (plastics industry).

In regard to licensing under Bureau of Indian Standard (BIS) Foreign Manufacturers Certification Scheme (FMCS), licenses are granted for a period of one year. The Bangladeshi private sector delegates felt that the license could be issued for a longer period of time (up to 3 years) and the cost reduced.

Additionally, loading and unloading is a perpetual problem which causes delays in terms of getting the products to markets. On average, only three consignments are cleared per day. The requirement felt is for 5 so as to reduce time costs. Costs also go up taking products from one state to another. It is hoped that after the introduction of GST from July 2017, things will improve. An MOU has been signed between Bangladesh and India during the visit of the Hon'ble Prime Minister of India. There has been a MoU signed regarding conformity and standards, which needs immediate implementation.

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<sup>11</sup>. Internet

<sup>12</sup>. Taken from the Report on the Dialogue Workshop by the CII

### **Agro and Agro processing sector**

In regard to food sector India has got relevant authority working under the Food Safety Act, Food Sector Safety Authority (FSSAI) plays a great role in this respect. Recently announced Food Safety Act in Bangladesh has established Food Safety Authority (FSA) too. A national Committee has also been formed, through which some sort of coordination with the ministries and organization to work in the food sector have been established. After having a full fledged quality infrastructure within the country, it should start working to maintain liaison with the international quality organizations and forums to know the gaps and find out ways on how to bridge the gaps.

There is a serious need to establish a close link between these two authorities so that standard and conformity assessments requirements are known each others. Experiences from the workshop reveals that there are huge understanding gaps among the stakeholders and government organizations of the two countries. There is a serious need to engage concerned ministries, departments to coordinate each other for contributing for an appropriate quality control and standard setting issues. The whole standards and regulations regime is an interdepartmental, inter ministerial, administration controlled process that needs to adhere to International Standard Organization (ISO), International Electrotechnical Commission (IEC) and WTO agreements and guidelines.

In Bangladesh, Ministry of Industries and its departments is supposed to play a prime role in maintaining standards for non food items. There is a serious need to develop a coordination mechanism among other Ministries dealing with Non-Food items, these are Ministry of Jute and Textiles and similar other ministries dealing with these items. While Ministry of Agriculture, Fisheries, Ministry of Food, Ministry of Health, Ministry of Science and technology and Ministry of Commerce and its relevant departments would need to have a good coordination to deal with the development of quality standard infrastructure for food items.

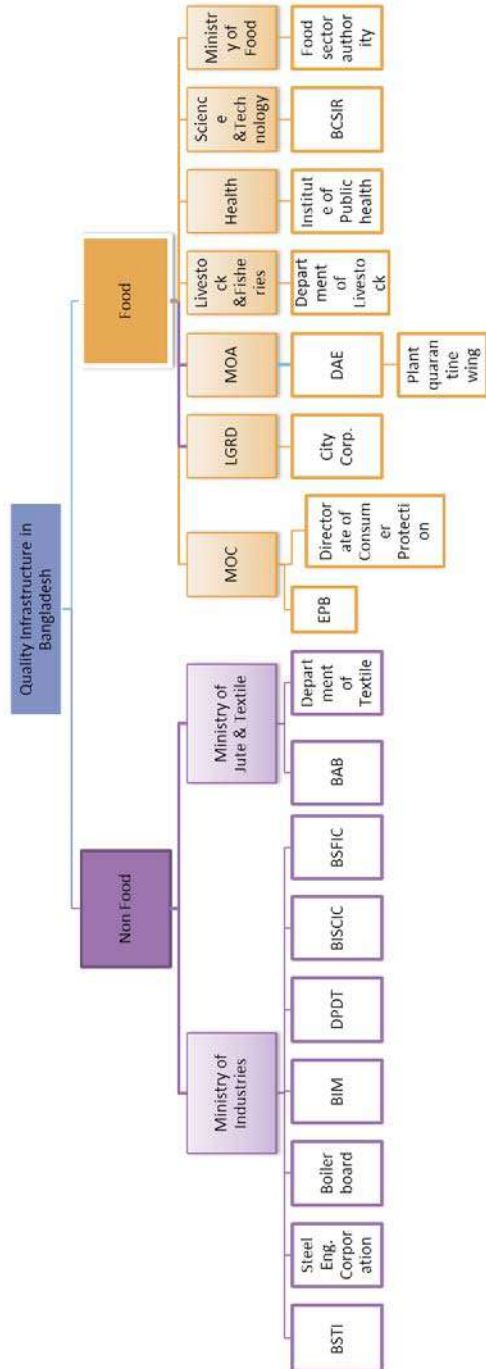
A flow chart of standard setting bodies of food and non-food sector is shown below:<sup>13</sup>

Notes: Non-Food sector issues are mostly taken care by the Ministry of Industries and concerned organization working under the Ministry, some of the important ones are as follows:

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<sup>13</sup>. Author's own research

Quality Infrastructure of Food and Non Food Sector of Bangladesh



Bangladesh Standard and Testing Institute (BSTI)<sup>14</sup>; Bangladesh Accreditation Board (BAB)<sup>15</sup> are the main organizations looking after the standard and testing issues. Concerned websites has given the full description of their activities. There are other organizations under the Ministry, such as;

Bangladesh Institute of Management (BIM), Department of patent Design and Trade Marks (DPDT), Bangladesh Small & Cottage Industries Corporation (BSCIC), Bangladesh Sugar and Food Industries Corporation (BSFIC), looks after different aspects and working under the Ministry of Industries. Department of textiles also looks after some textile related products.

In case of Food sector also there are a number of organizations working to look after these issues. At least 7-8 Ministries are involved, there is a need for coordination. BSTI sets Mandatory and Voluntary standards. In the Mandatory Standard list of 155 products there are about 62 food products for which Ministries and organizations looking after these products would need to maintain full contacts. There are technical committees in which all these Ministries have representations, these committees need enough research and follow-up and maintain contacts with the relevant organizations of the importing countries to upgrade standards of the products and process being exported to different countries.

#### **4.0 Policies for maintaining Quality and Standard of Products –a Comparison**

Bangladesh Standard and Testing Institute (BSTI) should also maintain its full communication with its counterpart organization of Bureau of Standard Standards of India (BIS). Bureau of Indian Standards Act of 1986 has been recently replaced by BIS Act 2016, they have new rules also, these versions seek to broaden its ambit, and allow the central government to make it mandatory for certain notified goods, articles and processes to carry the standard mark. BSTI should have all this updated information to keep it posted with the Bangladeshi entrepreneurs. BIS also introduced and operating a Foreign Manufacturers Certification Scheme (FMCS) since 2000, under this scheme, a license is granted for the use of a standard mark which indicates that a product is compliant with Indian standards.

Food Safety and Standard Authority of India (FSSAI), under the ministry of health looks after food safety regulations based on scientific evidence and risk

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<sup>14</sup>. BSTI Website

<sup>15</sup>. Website of BAB

assessment. Bangladesh Food Safety Authority has just been established under the Ministry of Agriculture needs to maintain a close collaboration with FSSAI to follow the changes they are going to put in together with their standards.

India has also issued its latest amendment in its Plant Quarantine Order 2003 and amended it as 2016. The plant quarantine order stipulates that no plants and products and other regulated articles shall be imported into India without complying the phytosanitary conditions included in this order. Bangladeshi Plant Quarantine wing under Ministry of agriculture would need to maintain a full contact with them so that any new emerging issues are instantly be brought to the notice of the concerned business entrepreneurs.

Beyond these, Ministry of Steel, Ministry of Electronics & Information Technology, Ministry of road transport and highways, central drugs control organization, Export inspection council, Agricultural and Processed Food Export Development Authority (APEDA), Ministry of Environment, Forests and Climate Change, Department of Industrial Policy and Promotion, Department of Telecom are contributing in their respective areas in India to make the quality and standard infrastructure in a strong footing.

Requirements of standards infrastructure for food and non food sectors are a bit different in nature. In order to reach new and diversified markets, with the selection of products, there is a strong need to understand the quality policy and structure of the concerned country, public private collaboration and public coordination to address these complex and dynamic issues are also important, otherwise export diversification targets would remain a far cry in the paper only.

Bangladesh is one of the fast-moving developing country aspires to be a middle income country soon, but the country is lagging behind in several aspects, one of these is maintaining a good quality policy and its infrastructure to ensure standards of produced in the country. Maintenance of quality and standards of a product, process as per the regulations and policies of the country is a priority. People usually considers it as non-tariff barriers (NTBs) and one of the protectionist mechanism, because importing country imposes burden of different conformity assessment standards before allowing goods from other countries. As an export-led manufacture- based country Bangladesh will have to go a long way in developing a standard quality infrastructure.

Conformity assessment involves Testing, Certification and Inspection. It is also highly related to the Technical requirements which refers to product-specific properties are legally binding and usually set by the country where the product is exported to (or imported from) – as opposed to voluntary standards. Technical

requirements define product characteristics, technical specifications of a set of a product or the production process and post-production treatment. Technical regulations include sanitary and phyto-sanitary measures which are generally implemented to protect human, animal and plant life and health from pests and diseases.

As a member of the WTO, south Asian countries are obliged to notify WTO on regulations that are proposed or adopted by these countries. A simple example shows that in respect of Technical Barriers to Trade (TBT) India issued 8 notifications<sup>16</sup>, in respect of Sanitary and Phytosanitary Measures (SPS) the number of notifications is 45 in 2016, while Bangladesh has not yet issued a single notification, in comparison, Afghanistan issued 2 TBT and 3 SPS notifications, Pakistan issued 18 TBT notifications, Sri Lanka 1 TBT and 6 SPS, Nepal issued 4 SPS notification. Bangladesh, Bhutan and Maldives are absent in this respect. Bangladesh has its TBT Focal point in BSTI and SPS focal point in Ministry of Commerce, these Focal points have to be re-anchored with special type of infrastructure and logistics to build their capacities, to track the notifications on a day to day basis put out by WTO in their website or circulate through International Standard Organization(ISO), otherwise cheap low graded product will have a strong inflow in the country, while our products in the foreign markets will face hard competition.

Similar to Bangladesh, Indian business entrepreneurs have also been facing challenges because there is a surge of standards and notifications and technical regulations of different government and private standards. India tracks the notifications put out by WTO which is about 3000 in a year, and government responds to these notifications and gets regular inputs from the stakeholders by having inputs from them. Bangladeshi stakeholders and government organizations would also need to work together to improve capacities to tackle the NTBs. There are 6 Export Promotion Council<sup>17</sup> working in Bangladesh under the Ministry of Commerce, can work to collect information from Importing countries for the exporters issued by the regulator of these countries, following examples of Export Inspection Council(EIC) in India.

Recently on April 3, Food Safety and Standard Authority in India( FSSAI) in a gazette notification as per relevant clauses of their Food Safety and Standards Act

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<sup>16</sup>. Back Ground paper for Private Sector Stakeholders and Government Officials

<sup>17</sup>. 'Improving regulatory standards for export diversification'. <http://print.thefinancialexpress-bd.com/2017/07/01/176548> (1st part) and Standards needs Continuous Updating, [http://www.thefinancialexpress-bd.com/2017/07/01/75603/Standards-need-continuous-updating\(2nd Part\)](http://www.thefinancialexpress-bd.com/2017/07/01/75603/Standards-need-continuous-updating(2nd Part))

2006 and Food Safety and Standards(Food import) regulations 2017 announced that BSTI in Bangladesh is authorized to issue certificate of test analysis for 21 food products, some of these are on fruit juice, jam, jelly, marmalade, pickles, chutney, food drinks, sauce, tomato ketchup etc. for which Bangladesh has got some strength and capabilities. Bangladesh would need to grab these opportunities immediately. There is an immediate need to consult with the new Food Safety and Standard regulations of 2017 as mentioned in the gazette notification and sit with the private stakeholders to know about their plan and help them to prepare accordingly.

Some may raise questions about the duration of certificates, as BSTI provides certificates for 3 years whether the same is to be agreed by FSSAI. From the side of Bangladesh it was also raised that while Bangladesh takes about 22 days for providing a certificate, what will happen when the number of consignments will increase, comparative figure in India is only 5 days. Number of accredited laboratories and its acceptance to the international level is also important. National Accreditation Board for Calibration Bodies (NABCB) accreditation equivalent and certificates with NABCB logo is acceptable internationally. Bangladesh also need to achieve this level.

Bureau of Indian Standard (BIS) has 12000 voluntary and about 250 mandatory standard. In parallel, Bangladesh has about 3900 voluntary and 155 mandatory standard which is to be enforceable through govt. act. In regard to International standards, BSTI adopted around 2000 standards of International Standard Organization (ISO), International Electrotechnical Commission (IEC) and Codex Standard. Bangladesh is a member of ISO since 1974 and in 2001 it became an affiliate member of IEC. The standard set by IEC and Codex is supposed to be reviewed in every 5 years as one of the requirements of WTO. In order to increase export from Bangladesh to India, Mutual Acceptance of Standards is important, Bangladesh and India could follow Codex standard. Harmonization with Codex equivalent standard will help increasing the possibility of acceptability, whether it is food or any other products, in that respect food safety, lab certificates etc. are important In addition, a study can be initiated to analyze the differences of standard setting parameters, if there is any, action may be taken to bridge the gaps by adopting those parameters immediately.

Need for regulations, which a government of a country need to enact to protect the food, animal and plant of a country. There are differences of regulations, voluntary standard, mandatory standards, standards in response to buyers demand and also private standards. There are social and environmental standards, biological standards etc. Regulations should have to give national treatment, as a

country can challenge if it is the deviation of national treatment. So the industries need to be trained to follow the regulations of the importing countries carefully. Quality cannot be regulated, it should be driven by the market. WTO encourages to follow the international standard. Extensive G-to-G dialogues is required to mitigate the understanding gaps.

Export Inspection Certificate (EIC) must meet the requirements of importing countries. Two very important documents are required; these are Certificate of Origin and Health certificate, these documents assured importers that regulatory authority has given certificates in that respect. India exports about USD 6 billion in year to Bangladesh, major items are cotton, vehicles & accessories, machinery, Iron and Steel, plastic articles. It also exports some food products, of which marine products is about USD 20million, dairy products USD 17 million, rice 14.4million and honey USD 1.2 million in 2016. Against these Bangladesh exports about USD 727million, in which ready made garments, leather goods, plastic and some agro-products are important.

Private sector of Bangladesh would need to participate in the meetings of standard setting bodies both at national, regional and international level. Similarly in case of regional standard, technical committee meeting would need to be represented adequately. Giving comments on the draft notifications, continuous consultation is important. Similar is the case for international standard. BSTI would need to play their due role in that respect. Private sector involvement is an urgent need.

#### **4.1 Examples of maintaining quality policy and Standard**

Experiences also helped in thinking on how standards are at the same time can help bring opportunities, example of British Export of 6 Billion pound within 5 years is a good example<sup>18</sup>. Private standard and specially buyers standards specially in respect of Textile, exporters would need to know these issues. In the whole EU country there is no mandatory standard while there is Suppliers Declaration of Conformity (SDOC), integrated market surveillance is helping them to avoid 3<sup>rd</sup> party certificate and they by themselves maintaining standards in such a way so that no complains come.

The examples of Uganda<sup>19</sup> is another experience for us, the Ugandan National Bureau of Standard UNBS) has mandated that an importer, or a manufacturer of

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<sup>18</sup>. Mr N Venkateswaran, Director, National Accreditation Board for Testing & Calibration

<sup>19</sup>. Workshop on Standards and Conformity Assessment with Regards to Bangladesh-India Trade Relations, Taj Mahal Hotel, Mansing Road, 24-25 May, New Delhi India. Back ground paper for Private sector stakeholders and Government Officials



any commodity for which a compulsory standard specification has been declared shall ensure that the commodity bears a distinctive mark for identified 12 sectors, these are toys, food, electrical and electronics, auto, chemical, mechanical, textile and leather, rubber, wood, paper and safety equipment. Any Bangladeshi entrepreneurs willing to export textile and leather from Bangladesh to Uganda need to know the information of having these compulsory licenses. Uganda has issued more than 30 notifications of petroleum products referring American Society for Testing and Materials (ASTM) norms, such measures are issued because of huge investment from USA.

Similar is the case for Taiwan<sup>20</sup>, their authorities have made it mandatory for exporters to mark the presence of restricted substances on the bodies, packages, stickers, or the instruction books for the commodities exported into Taiwan. The substances that have to be marked include lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and biphenyl ethers. Bangladesh so far do not have export of these products.

China mandated the issuance of quarantine certificates for 11 notified pests, however, interestingly countries which do not have these pests have to also provide the quarantine certificates there by increasing compliance.

The Gulf Cooperation Council (GCC) issued a regulation stating that imported eggs will have to carry a mark while locally procured eggs will have a green mark. This was to let consumers know whether the egg was imported or local. Countries, including India protected stating that the colour choice may lead to confusion among consumers as red colour may denote rejection.

There is a growing harmonization in Africa, countries like Kenya, Tanzania, Rwanda, Uganda and Mauritius have issued product based standards for food products and non food products. If these information are not known to the exporters it is almost difficult for anybody to enter into these markets.

As like as Africa, regional standard need to be enhanced and for a harmonized standard among all 8 SAARC countries SARSO could work. Trade and Industry should have adequate information which are generally available in the internet, but to give a better understanding on these technical issues, Export Promotion Bureau (EPB) should provide all information to the stakeholders. Information should be collected from the Food Safety Authority of India. Enquiry Point of this organization can be contacted to collect these information. All Enquiry Points of SAARC countries should have close contacts.

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<sup>20</sup>. Ibid

For building capacity of the Industries, SMEs, farmers to be able to meet the world standard of Food Safety and promote Exports, BSTI would need to develop SOPs differently for agricultural practices, manufacturing practices, storing practices and laboratory testing practices. In order to meet the Conformity Assessment issues, there is a need to increase the capacities of Bangladesh Accreditation Board (BAB), nonstop upgrading is required as international standards are refining continuously. There is accredited labs under different ministries, but their testing labs, standards of the technicians needs to be better-quality. Accreditation recognizes technical competence, ensure customer confidence, minimize risks, increases marketing advantage and international recognition etc. Industry needs up-gradation and engage them in each and every stages of policy discussion and establish strong public private dialogues.

Globally goods trade is more than about 18 trillion US dollar, while service trade is USD 8 trillion, but growth of service sector is much higher, so not only goods standard, service standards would be a main concern soon. Bangladesh is still much behind in-service export but it needs to start thinking for this area also.

Concerned standard setting organizations would now start working seriously to abide by the international rules and regulations at the same time be ready at the home front following examples of good practices, otherwise export diversification would remain out of reach. Successful South Asian country's examples could be a learning.

#### **4.2 WTO Policies**

The discussions on Food sector began with Components on WTO on Food Safety (SPS and TBT), Principles governing SPS and TBT Agreements and Special and Differential Treatments. The purpose of SPS was also expanded upon and the International Standard Setting bodies in Food, Animal and Plant safety were explained. The Basic principles governing SPS are – Transparency and Scientific Justification.

The WTO SPS Committee and Special & Differential Treatment (S&DT) functions for addressing Specific Trade Concerns (STCs) and strengthening implementation. An individual country has its commitment under the SPS, specifically, codex is the reference standard under WTO.

Understanding on the essential elements of a food control system is important. A food control system contains both strategic and regulatory elements. The need for strategic and regulatory elements were to be cleared among the stakeholders.

More importantly, the common problems for decreases in exports and increases in imports can be traced to a lack of commitment to food safety, lack of awareness about international standards and a lack of training.

To combat these, the aim is to first understand the objectives of one's food policy and based on the same frame a policy for food safety and set up a strategy for the country and regulatory mechanism. It also requires keeping updated and making use of codex standards, set up an infrastructure for food safety and invest in training.

India has increased its participation in the Codex and also tackle its domestic scenario which poses huge problems in terms of malnutrition, hunger, calorie deficiency etc. This step wise and strategic approach helped improve India's situation including increases in food exports and decreases in measures of malnutrition, anemia etc. Bangladesh needs to establish its strategy and proceed step by step to accommodate WTO principles following examples of South Asian countries.

Some questions emerged that in order to be a safe domestic markets what are the steps needed to be taken. There is also a lack of awareness and training among manufacturers. The world is currently moving from products based standards to process based standards.

### **5.0 Identifying concrete areas that are currently impeding regional trade**

Bangladesh is lagging a bit behind in global competitiveness and its export is highly concentrated on a single product on RMG. Though Bangladesh has a comparative advantage in many products, especially in the labor-intensive products the comparative advantage is different from competitive advantages, following are some examples.

Food and Non Food Sectors<sup>21</sup>:

### **6.0 How to move forward**

Cost of Health certification for leather goods through Health Quarantine department to be looked into keeping in mind for requirement of Health Safety aspects. Bangladeshi entrepreneurs wanted to see more accredited labs in the port through which Bangladeshi goods are being exported to India. There is a need to initiate a study to see the amount of exports through these ports to justify the case

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<sup>21</sup>. Taken from the Report to the Chemonics by BUILD

Food Sector	Organization Involved	Non Food Sector	Organization Involved
Active participation of Bangladeshi concerned organization in the Codex Meetings is important	BSTI	Labeling is one of the concerns for non-food sector( Textile, Leather, Jute and Plastic were present). These sectors would need to take a serious look for the labeling requirements of the destination market. "Made In Bangladesh" is one of seal used for sending goods from Bangladesh but usually does not get acceptability or face question.	BSTI
Regional standard need to be enhanced and for a harmonized standard among all 8 SAARC countries SARSO could work to support exporters to be prepared for importing markets.	SARSO	Voluntary standards are especially for jute manufacturing products, in order to establish better understanding among the entrepreneur capacity building among the private sector is important. Jute industry needs technological up gradation and produce more value added products. Capacity building in B2B level is another segment needs attention.	BUILD & CII
Trade and Industry should have adequate information which are generally available in the internet, but to give a better understanding on these technical issues, Export Promotion Bureau(EPB) of Bangladesh should provide all information to the stakeholders and need to work as EIC in India. Information should be collected from the Food	FSSAI	Counter Freight manufacturing is imposing burden to the legal jute import. Enforcement of Law is required.	MOC, MOI, NBR & Jute Ministry

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<p>Standard and Safety Authority of India(FSSAI). Enquiry Point of the this organization can be contacted to collect basic information. All Enquiry Points of SAARC countries should have contacts.</p>			
<p>The capacity of the Industries, SMEs, Farmers to be able to meet the world standard of Food Safety and promote Exports, BSTI would need to develop SOPs for Agricultural practices, Manufacturing Practices, Storing Practices and Laboratory Testing practices etc.</p>	<p>BSTI</p>	<p>Sampling is done by the customs and designing for the sampling while importing, needs to take a better investigation.</p>	<p>Customs</p>
<p>In order to increase export from Bangladesh to India Mutual Acceptance of Standards, Bangladesh and India could follow Codex standard. Harmonization with Codex will help increasing the possibility of acceptability, whether it is food or any other products, food safety, lab certificates etc.</p>		<p>Foreign manufacturing certificate is another concern expressed by the exporters of Bangladesh.</p>	<p>BUILD &amp; CII, BSTI &amp; BIS</p>
<p>In order to meet the Conformity Assessment Issues of these identified sectors there is a need to increase the capacities of Bangladesh Accreditation Board (BAB), continuous improvement is required as international standards are also continuously changing.</p>	<p>BAB</p>	<p>MoU signed on Standard and Conformity Assessment when the Hon'ble Prime Minister of India visited Bangladesh. Both the countries would need to work together on how to implement the MoU.</p>	<p>CII &amp; BUILD</p>
<p>In Bangladesh there are accredited labs under different ministries, but their testing labs, standards of the technicians need to be improved. Some participants in the program can take the responsibilities to convey these messages to the</p>	<p>Task force participants</p>	<p>Plastic products need SGS certification. Documentation evidence can be shared with BUILD for taking up the case with CII by the concerned stakeholders.</p>	<p>Concerned Stakeholders</p>

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Private sector of Bangladesh would need to participate in the meeting of standard setting bodies both at national, regional and international level. At the national level BSTI is the standard setting body has also the responsibilities to circulate draft notifications through their websites and inform concerned stakeholders so that before setting an standard full transparency can be maintained. Similarly in case of regional standard, technical committee meeting would need to be represented adequately. Giving comments on the draft notifications, continuous consultation with the stakeholders is important. Similar is the case for international standard.

Bangladesh would also need to consult notification of WTO for other countries. So far Bangladesh has not been able to send any notification to the WTO. It would help ensuring transparency in the standard setting process and create awareness so that exporters are well informed ahead of time before notification has been made public and prepared accordingly. At the same time Bangladesh would need to be ready to respond to the notification which are not justifiable for Bangladesh. In that respect Bangladesh need to develop enough capacities.

Quality Infrastructure has four specific pillars, these are standard, Conformity Assessment, Meteorology (Measurement), Accreditation. Coordination among these bodies to act properly is important. Harmonization of regional standard is another issue for which more and more consultation is required. Private standard and buyers requirements specially in respect of Textile, exporters(e.g, Social Audits) would need to be known by the exporters.

### **6.1 Exploring the creation of a Forum**

During the discussion it was also felt for a need of establishing a Forum to raise consolidated voice. The Forum will of course underline conformity assessment tools such as standards, testing, inspection, and certification and cross border transportation to facilitate the reduction of trade restrictions between the two nations and bridge information gaps among stakeholders. As the second step, we can promote inter-regional connectivity by developing mutual collaboration between governments and industry stakeholders from both sides in a bid to reducing non-tariff barriers to trade in Bangladesh and India.

Forum comprised of policymakers, regulators and representatives of standards, accreditation and conformity assessment bodies initially from India and Bangladesh can be created. Taking the outcome and necessity of the Forum into account, it can also be represented by other South Asian countries in future.

### Next Steps of the Forum

- i. Organizing dialogues for filling information gaps among stakeholders and knowledge-sharing of good practice for regulatory reform;
- ii. Providing practical policy recommendations on how countries, either unilaterally or through a regional process where there might be gains from cooperation, can remove existing NTBs as well as discipline the development of new ones;
- iii. Harnessing regional integration more effectively as regional integration offers the prospect of improved access to neighboring markets;
- iv. Advocacy for consultation with the trading partners before implementing any import bans, quotas, permits and licensing;
- v. Reducing bureaucratic requirements, streamlining border management procedures and implementing trade facilitation measures, including one-stop border posts to lower border crossing times and reduce transport costs, at least along the main land ports;
- vi. Controlling new NTBs;

The Secretariats (CII and BUILD) of the Forum would be responsible for the policy direction that the Forum takes from time to time. CII and BUILD can be vested with the authority and responsibility to exercise control over all the activities conducted by the Forum. In addition, the Forum can be designed as a

	India	Bangladesh
<b>NTB Forum</b>	Secretary (Co-chair) Ministry of Commerce	Secretary (Co-chair) Ministry of Commerce
	Public Sector Members may include Bureau of Indian Standards/Industries Ministry (Member) Food Safety and Standard Authority of India	Public Sector Members may include Ministry of Industries Ministry of Agriculture Bangladesh Standards And Testing Institution Business Promotion Council Food Safety Authority
	Private Sector Members The Federation of Indian Chambers of Commerce and Industry(FICCI)	Private SectorMembers may Include The Federation of Bangladesh Chambers of Commerce and Industry, Dhaka Chambers of Commerce and Industry and Metropolitan Chambers o Commerce and Industry
	Secretariat Confederation of Indian Standard	Business Initiative Leading Development



sustainable platform for action-oriented tool that simplifies the process of export and import by working closely with the two governments. It can also feature focused public-private dialogue, backed by rigorous analysis and advocacy to ensure that concrete and results-based reforms are implemented.

Steering Committee that the Forum would develop to be a leader in providing training in capacity building, and acts as the platform for groups to share their best practices to enable them learn from each other. The ultimate goal is to empower both importers and exporters so that they sensitize themselves including government stakeholders about the applicable technical requirements, standards, and sanitary and phytosanitary measures.

The formation of the Forum can be as follows;

If the Forum can be launched and supported by both the countries, there is a tremendous opportunity to see some improvement in addressing the NTBs and bridging the understanding gaps and thus reducing trade gaps among SAARC countries in general and Bangladesh-India in particular.

## **7.0 Conclusions and Findings for Solutions<sup>22</sup>**

As long as the same mandatory requirement exists for national industry, labeling would have to be complied with regardless of buyer preference. If Indian industry feels that the requirement should be changed, then they would have to approach the government from their side.

There was concern over technological know – how and whether it could be addressed through more robust information dissemination and training. However, the Bangladeshi private sector must identify specific needs for the above to be done effectively. Bilateral cooperation between the Bangladeshi private sector and the Technology Development Board under the Department of Science and Technology of the Government of India could be encouraged.

Formal requests regarding the same would have to be made by those Bangladeshi industry members who wish for this transfer to occur. Visits could also be arranged for Bangladeshi industry members to their Indian counterparts . Technology transfers in value-added products could be encouraged to increase access to markets for diversified goods.

There is a perception that Bangladeshi leather products are tested more may be due to more random sampling and testing rather than any inherent bias. The same is true for RMG. There is no official study that states that such a bias exists.

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<sup>22</sup>. Short Survey done in the New Delhi Dialogue Workshop compiled by Kaitlyn Bacca

If the argument is that border checks at the Indian border are more than at other world borders, then that is a matter of state prerogative. However, if the argument is that Bangladeshi products are tested more often than the same products from other countries, then a comparative study must be conducted and submitted to Indian authorities by Bangladeshi stakeholders, following due course.

As far as the issue of setting up testing labs is concerned, in India, it is the private sector that takes up this task on behalf of the government. Labs are set up based on market requirements. A study into the testing lab requirements must be done. This would require looking into the volume of trade flows in the areas nearer the India – Bangladesh border. Stakeholder consultation would be required for the same.

The status of MRAs between accreditation bodies needs to be looked into. Especially as concerns were expressed in regard to acceptance by regulators of certifications for which equivalence has been established. From the experiences it is of course seen that a significant amount of time has been elapsed because of administrative procedures for getting a MRA. A deeper study of Bangladeshi standards may be conducted to create and negotiate substantive MRAs. This could be a collaborative effort between CII and BUILD so as to find products in which parallel standards exist.

It is important to understand that accreditation only facilitates acceptance of conformity assessment results. It does not guarantee this. If a sector is regulated, the concerned regulating authority has discretion in whether or not it accepts the test results. In order to address issues surrounding SGS certifications for the leather industry, the Bangladeshi private sector would have to provide specific orders and notifications to be taken up at the government to government level. Health certification concerns matter regarding SPS and cannot really be challenged. If issues are faced in conforming to the standards set, it may be alleviated through training and skills development.

Creating more Integrated Customs Ports (ICP's) was one of the proposals. Presently there are only 3 ICPs out of 25 customs ports. Both the Indian and Bangladesh side would need to concentrate in this issues, at least there should be an efforts to identify most important ports which needs ICPs. There is a need for clarity in identifying ports which may be developed as Integrated Customs Ports (ICPs).

Non payment by buyers is another concerns, where Central Bank has a great role to play. There is a need here for government – to – government collaboration to

get a solution. Finding government to government mechanisms for technological transfer is also important, making government more aware of industry issues is required and in that respect public private dialogue is important.

Building connectivity between counterpart labs, training on voluntary standards for Bangladeshi importers, better coordination through the International Laboratory Accreditation Cooperation(ILAC) and the Asia Pacific Laboratory Accreditation(APLAC), laboratory facility for testing; strengthening of lab capacities for accredited analysis, non-acceptance of test certificate were raised in several occasion. Identifying the correct agencies for training purposes and for this an information bank of experts may be created.

There is a need for extensive studies and research on the standards to be adopted which are important for the country based on the products on which we have competitiveness, some of these are ISO 17025, ISO 170001 and R&D – transfer of technologies & knowledge. Increase negotiation power for market access to avoid discrimination of trade between India & Bangladesh, bilateral agreement, more stakeholder engagement, negotiation, dialogues were some other prescription by the participants.

Exchange of information, awareness of standards and problems, transparency of procedures, market access, more positive signs from the govt, mutual acceptance of standards (e.g. BSTI & BIS should have equal standards), harmonization of international and regional standards (e.g. codex, SARSO), more standards for food products, fisheries sector are required. Agro products standard of BSTI should be acceptable, BSTI supervision of agro foods such as vegetables, fruits is almost absent. BSTI should take initiative in this field.

Bangladesh –India trade has been discussed in several studies, workshops, seminars and in different government and private sector forums, but the problems remains in the same place. NTBs are also a debatable issues. India has given duty free quota free access to almost all products from Bangladesh, but the supply side constraints and market access barriers are still in place. Standard and quality related issues plays as one of the important NTBs in the South Asian countries, these issues are complex and need long term strategy to resolve. Bangladesh needs continuous discussion with all the concerned authorities of India to raise these issues in the right forum complying all official formalities, other wise Bangladesh-India trade will remain difficult to handle as it is the case presently.

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## A Note upon Ethics and Economic Modeling

MOHAMMAD ALI AKBAR\*

### **Ethic is defined to include the following**

1. “Moral- if they reflect individual’s values and those of society.
2. “Immoral- if they go against individual’s value or Societies.
3. “Amoral (asocial) - if they do not reflex choice based on values or social norms.
4. Economic function of individual or society [Maximization of profit or minimization of costs i.e. frugality, savings, investment etc.]

### **Development of Social Sciences and Ethics**

One can trace the development of ethics from fifth centuries BC to Greek sophist, Protagoras who argued that “moral rules were conventions created by society rather than absolute truths. He emphasized that these are necessary for society to function. They could be challenged and changed. Both Plato and Aristotle wanted to go beyond this idea of conventional morality. They should link between virtue and happiness in order to find more objective basis on formal rules in accord with nature, this Aristotelian views were linked to the growth of knowledge based on natural law.

There is debate about the function of rules in a society given in Plato’s Republic. Thrasymachus argues that conventional justice promotes the interest of the Rulers and the base for ethics is self interest. Glaucon replies that if everyone acts for self interest or self motives, then all we end up suffering in some way exploited by others. The conventional rules therefore is not acceptable. Plato took their debate further pointing up that all elements in society needs to work air together for general health of the whole.

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\* Retd. Chief, Planning Commission.

Both Plato and Aristotold could be said to base ethics nupon reason Value free ethics is meaningless it could be argued that of application of ethic is based on reason and experience.

### **A parallel development has taken place in the digital phenomena**

A computer is logically effective but cannot have morality and immorality because it lack and internal setups values with which to assess the choices. A computer & based on binary principles and has memory cells am storage capacity and can be called back. But the choice is limited.

The big look al early debate on social ethics listed three points.

1. "Society imposes and encourages moral principles in order to maintain social cohesion and minimize the damage that done by the exercise of unbridled individual desires.
1. Any moral and legal system will therefore result of negation between the needs or society and the freedom of the individual.
03. Rational argument about the needs of individual or of society spring from values' judgment and pre supposition.

For looking at moral issues concern with law and order and punishment that society on those imposes who break laws involved three questions:-

01. "Does society need this particular law for least well-being (Humanities First consideration).
02. Has the law advisor a suitable balance between any conflicting needs of an individual and society.
03. Upon what values is it based, and are these values widely accepted by society."

The analysis lists question of law, order, rules, regulation, execution and all others need to humanism.

The current thought of social contract theory as proposed by professor john Rawles, In his book, a theory of justice (1972) in terms of two principles:

01. Each person has equal right to the maximum amount of liberty, compatible with Liberty for all.
02. Inequalities are to be allowed only there is reasons to think will benefit the least well off in society.



## **Part-II**

The question of economic modeling is as accepted by economists is discussed under micro, macro, static and dynamic consideration. There are two type of models namely 1 (one) mathematical-Algebraical utilizing strastics, called (2) econometric model-Mathematical models are developed as linear, non-linear continous, dynamic and sequence model; and the econometric models by the use of elementary statistical, simple regression, multivariate and multiple relations.

A model is simplified reality bounded by time and space called R chequing observed elements which are to be systemizea because of differences for relevancy or adequacy-an objective is required-a set of observation might be termed a model-which are being analyzed under exposition, (1) Descriptive model, (2) Explanatory model (3) Forecasting model (4) Policy model/Decision Model.

These models are utilized to explain economic and social phenomena.

Two approaches have been defined:

Integrated & not interacted.

Is it value tree?

An objective function has to be defined to find solution for constrained optimum by the use of a computer.

The discussion assumes system. The system must have open. It is the thought that protestant. Ethics help investment growth and can brought about/financing industrial revolution in Britain and Europe.

This leads one to think in terms of a educational and scientific estate.



## Calculated Risk and Yield Curve of Bangladesh

IMAM ABU SAYED\*

**Abstract:** *Broadly financial risks are two kinds. One is calculated risk and other is uncalculated risk. Calculated risk is better than uncalculated risk. Calculated risk can diversify. While, uncalculated risk is hard to diversify. Domestic and geopolitical risk is responsible for uncalculated risk. Cushion like substantial foreign exchange reserves for instance can improve the ability to pay and reduce the country's risk premium in international finance addressing uncalculated risk. Calculated risk such as pricing of government bonds impact the book value of banks. Due diligence and fiduciary responsibility issues relating to government bills and bonds pricing is included in this study. Calculated risk issue for the first time publicly demonstrated in this paper in deriving yield curve of Bangladesh.*

### Introduction

Mainly calculated risk related to derivation of yield curve of Bangladesh and related issues are described in this paper. At the same time, uncalculated risk also highlighted to understand the broad category of risks. This paper will provide insight to the banks treasury and other stakeholders to understand the pricing of government bills and bonds. The use of treasury bills and bonds are multidimensional. These instruments are used as underlying assets for repo and inter-bank repo impacting the liquidity and yield.

Treasury bills and bonds are used for government deficit budget financing. Role of Central bank is crucial to manage sustainable debt with lower cost to the government. Consequently, central bank considers macroeconomic perspective in deriving yield for government bills and bonds. These yields also impact the book

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\* Deputy General Manager (Research), Monetary Policy Department, Bangladesh Bank.

value of banks. This paper suggests that weighted average rate (WAR) generates calculated risk, which can be amortized following accounting and finance norms. Related accounting and financial issues impacting liquidity and yield can be found in the different section of the paper.

### **Organization of the paper**

Literature review is presented in Section I. Methodology is described in Section II. Section III deals with calculated risk for derivation of yield curve of Bangladesh and related issues. Section IV highlighted conclusion.

## **Section I**

### **Literature review**

Literature survey on debt management and OMOs is conducted to gain wide-ranging knowledge related government debt in Bangladesh. Adepoju, Adenike Adebunola and Obayelu, Abiodun Elijah (2008) has reviewed the roles of debt management practices on sustainable economic growth and development with particular emphasis on Nigeria. Information was generated from literature, the Nigeria Central Bank and National Bureau of Statistic Reports. The analyses of the data collected with descriptive statistics indicate that, availability of access to external finance strongly influences the economic development process of any nation. Debt is an important fund needed to support sustainable economic growth. But a huge external debt without servicing in case of Nigeria before year 2000 constituted a major impediment to the revitalization of her shattered economy as well as the alleviation of debilitating poverty. The much needed inflow of foreign resources for investment stimulation, growth and employment were hampered. Without credit cover, Nigerian importers were required to provide 100 percent cash covers for all orders and therefore, this placed a competitive disadvantage compared to their counterparts elsewhere. Failure of any owing country to service her debt obligation results in repudiation risk preventing such to obtain new loans since little or no confidence will be placed on the ability to repay. It will also undermine the effort to obtain substantive debt relief over the medium term with a tremendous increase in interest, arrears and other penalties. This will subsequently depress the economy both in the long and short runs. Best arrangement in debt payment must be put in place from time to time in response to changes in the economy and the polity. Debt can only be productive if it is well managed and if the rate of return is higher than the cost of debt servicing. In Bangladesh debt management is crucially followed considering market timing.

Observing the market re-issue of government bonds need to be conducted to maintain the lower interest cost of the government. As a market maker, BB necessitate to decides the cut-off rate of the auction and devolve amount of bills and bonds on primary dealers and BB. For effectual debt management the government, yield curve, bills and bonds and other financial issues are described in this paper.

Hai-Chin Yu (Taiwan), Ken H. Johnson (USA), Der-Tzon Hsieh (Taiwan) -2008 using an effective sample of 3,453 observations selected from the Taiwanese stock exchange attempts to reconcile divergent outcomes from the extant literature on debt structure (public, bank, and non-bank private debt). Sampled firms from this emerging market generally acquire debt from both public and private sources, with a strong preference for bank debt, suggesting, among other things, that bank debt and public debt complement each other rather than acting as substitutes. In Bangladesh, government debt from the DMBs is complementary. On the other hand government debt from the BB is substitute considering the inflationary impact of money. Refinance of reserves of BB to the export and SME sector deserve more priority to encourage the manufacturing sector in Bangladesh. Interbank (OTC) repo of bills and bonds and effective secondary market will minimize the crowding out effect relating to BB credit to the government.

In the United States, as of 2006 the Fed sets an interest rate target for the Fed funds (overnight bank reserves) market. When the actual Fed funds rate is higher than the target, the desk will usually increase the money supply via a repo (effectively lending). When the actual Fed funds rate is less than the target, the desk will usually decrease the money supply via a reverse repo (effectively borrowing). The European Central Bank has similar mechanisms for their operations; however, it uses a four-tiered approach with different goals: besides its main goal of steering and smoothing Eurozone interest rates while managing the liquidity situation in the market the ECB also has the aim of signalling the stance of monetary policy with its operations. Repo and reverse repo (policy) rates are also used as signal in Bangladesh economy. In US rise in policy rate from 0.025 to 0.50 basis points has different meaning as the economy is fully convertible considering BOP frontier. The rise in US policy rate will enhance inward flow of fund from the emerging market with higher rate of return in US\$. Bangladesh BOP is not fully convertible. The rise in the rate of Taka attracts foreign remittance, export and also portfolio investment in the stock market. Lower bank deposit rate has trade-off between money and capital market investment. As the financial statements understanding capability in general is moderate in the country the movement of fund from DMB's to capital market

based on Price Earnings ratio (P/E) is not evidently effective. This study put thrust on maintaining proper calculated risk in case of government treasury bills and bonds. Pradhan (2009) Caballero (2011), Akhtar (1997), Varadarajan (2011) and Mike (2002) have worked on debt management and OMOs specially for developing countries and linked to yield curve.

## **Section II**

### **Methodology**

Significance of WAR and cut-off or coupon rate is quantitatively highlighted in this paper. Related factors such as interpolation, extrapolation, dirty price, stress testing, duration gap and other financial elements impacting liquidity and yields are analyzed meticulously. Government debt management tools such as bills and bonds are systematically examined for better management of liquidity and determining yield from the central bank fiduciary responsibility perspective.

## **Section III**

### **Calculated risk for derivation of yield curve of Bangladesh and related issues**

For deficit budget financing government issue bills and bonds through central bank. The yield curve shows the return against different tenor bills and bonds. This yield rate is used for valuation of government bills and bonds. Higher yield lower the price of bill and bond in the book value of bank. The yield curve can be prepared plugging WAR or cut-off/ coupon rate of government treasury bills and bonds in the left axis of a plot. WAR is summation of different rates ranging lower to higher, which is lower than cut-off rate. We know interest rate is inversely related with bills and bonds price. Using WAR rate calculated bills and bonds price will be higher than plugging cut-off rate. This generates volatility in the book value of bank creating calculated risk. Calculated risk high price of bills and bonds can be amortized or managed by the banks following accounting norms.

According to credit rating agency risk are two kinds. One is calculated risk and other is uncalculated risk. Calculated risk is better than uncalculated risk. Calculated risk can diversify. While, uncalculated risk is hard to diversify. Consequently, it is crucial to identify the calculated and uncalculated risk. Uncalculated risk increases the risk premium in international finance. Domestic and geopolitical risk is responsible for uncalculated risk. Country risk matter in not that much easy to calculate. Occasionally, one country's contingent liabilities may lead high risk premium in international finance. Still that country possesses

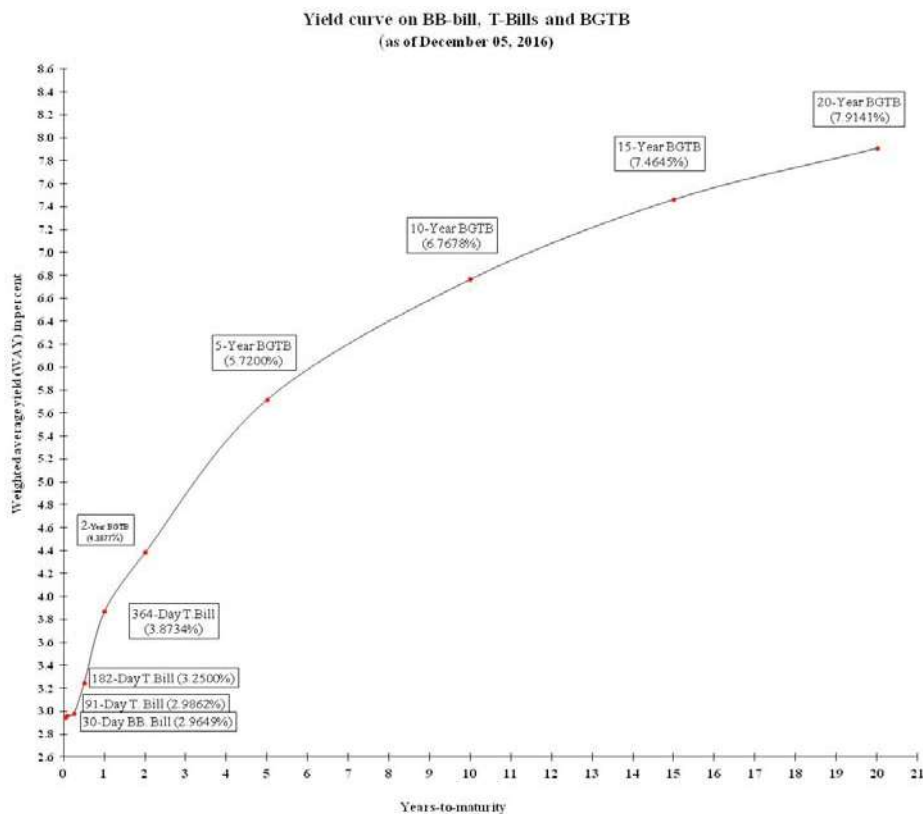
growth potentiality. Cushion like substantial foreign exchange reserves for instance increase the country's ability to payments and reduce country risk premium in international finance. Political stability depends on the accustomedness of the people. If the people are accustomed with the political instability then it will be naturally adopted in terms of consumption, savings and investment ensuring movement to the higher frontier of economic growth. Naturally, higher demand like our country will proportionately use the factors of production (labour and capital). Greater political stability will generate higher potential level of output. Thus our GDP can be reached more than 7 percent level. At the same time, due diligence and fiduciary responsibility issues relating to credit rating can improve the country's global trust in international finance.

Extrapolation, Interpolation, dirty price and reissue of bonds are the different segments of bonds pricing impacting liquidity and yield. These issues are meticulously highlighted in this paper for developing secondary market of bills and bonds. Treasury bills and bonds share is 71 percent of total banks liquidity. Momentum in secondary transactions of these securities will fulfil the liquidity need of banks. Related agenda for development of bills and bonds market are also described in the paper for better performance of banks treasury. Thus analysis of government securities from the central bank perspective is fiduciary responsibility helping agent to form rational expectations about interest rate, exchange rate, inflation and GDP.

Yield curve (**Chart**) is the combination of interest rates against different maturity of bills and bonds. WAR of accepted bids is used to derive the yield curve. Interpolation and extrapolation method is used to derive the yield of a particular maturity due to lack of secondary market in Bangladesh. Summation of all individual auction rates provides the shape of yield curve. Amount of liquidity and need of the government specifically establishes the yield. Upward sloping yield curve shows the positive expectation about the economy. Yield curve rate is used for calculating deposit and lending rates of banks bearing in mind the liquidity of the economy. It will also help to evaluate the held to maturity (HTM) and held for trade (HFT) securities of the banking and trading book of the banks.

### **Salient features of Government Treasury bills and bonds deriving yield curve in Bangladesh**

Bangladesh government issue treasury bills and bonds for financing annual development program (ADP). The tenure of Treasury Bills is 91-Day, 182-Day and 364-Day. These are called short-term bills, which is less than one year.



Chart

Bangladesh government also issue long term bonds these are 2-year, 5-year, 10-year, 15-year and 20-year Bonds. These bonds indirectly affect the liquidity of banking system. If government borrow money using these bills and bonds from the commercial banks or other parties that has less inflationary impact comparing borrowing from Bangladesh Bank (BB). If government borrow money from the commercial banks and repay the past due loan taken by the government from BB then the liquidity of the banking system shrink resulting surge in call money rate. If the government spends the borrowed money through treasury bills and bonds for ADP implementation then the liquidity again injects in the market.

### **Basel II capital adequacy requirement of government bonds**

According to Basel II risk weighted asset of Tk. 100 value 5-year government treasury bond with 2-month remaining maturity for instance is Tk. 2 ( $100 \times 0.20\% \times 10$ ) using standardized approach. To arrive this number 0.20% risk



factor for 2-month remaining maturity is multiplied by conversion factor 10 (capital asset ratio) with base amount. Bank is needed to keep 10% of risk weighted asset i.e. Tk 0.20 in Tier 1 for minimum capital requirement. DMBs HFT securities need to calculate in the trading book and HTM need to report in banking book. Calculation of HFT treasury bills and bonds is needed to incorporate in the trading book rather banking book to address general market risk. The specific risk of treasury bills and bonds is zero. Pillar 1 of Basel II deals with minimum capital asset requirement of risk weighted asset of Tier 1 and Tier 2. Pillar 2 deals with supervisory issues addressing related risk for adequate capital asset requirement. Pillar 3 of Basel II reflects disclosure issues of banks and financial institutions.

**Stress testing of government securities:** Rise in interest rate at 1% level will decrease the price of bills and bonds used as base. Fall in risk weighted asset of bills and bonds due to lower base surfacing from market will lead to maintain lower capital in the DMBs balance sheet. Lower capital in the balance sheet will condense the capital asset ratio (CAR). Further rise in interest rate at 2% or 3% level eventually may lower the CAR below 10. All these depend on market rate of HFT government securities. It may be mentioned that CAR below 10 according to Basel II will expose the bank as vulnerable.

**Duration of bond:** Government bond with a yield to maturity of 8.00%, a par value of Tk.100, a coupon rate of 10%, and a cash-flow frequency of 2 time(s) per year will have a duration of 4.10 years. Duration measures how long, in years, it takes for the price of a bond to be repaid by its internal cash flows. DMBs need to consider it cautiously, as bonds with higher durations reflect more risk and have higher price volatility than bonds with lower durations.

Duration GAP (DGAP) impact the market value of equity and overall position of the bank. DGAP crop up combining weighted average duration of assets and liabilities of which investment of government securities are integrated. Formulation of DGAP:

$DGAP = DA - (MVL/MVA) \times DL$  [DA=Duration of asset; DL= Duration of liability; MVL= Market value of liability and MVA= Market value of asset].

$DGAP = 3.07 - (10000 / 11000) \times 1.62 = 1.60$ . Longer DGAP causes larger change in the market value of DMBs equity. 1% rise in interest rate will reduce the market value of equity equivalent to Tk. 161.47 crore impacting balance sheet of banks as follows:

$$\Delta MVE(-DGAP) \times (\Delta i / (1+y)) \times TA$$

$$= -1.60 \times (0.01 / (1+0.09)) \times 11000 = -161.47 \text{ crore}$$

**Extrapolation of bond yield:** Due to lack of secondary market the yield for 1.5 year of a 2 year bond using yield curve rate of related tenure can be premeditated as:  $2 \text{ year yield}(9.660\%) - ((5 \text{ year yield}(10.9200\%) - 2 \text{ year yield}(9.6600\%))/5 - 2) \times 1.5(\text{period passed: } 1+0.5) (26\text{weeks}/52\text{weeks})0.9.6600 - (((10.9200 - 9.6600)/3) \times 1.5) = 9.0300\%$ .

**Interpolation of bond yield:** Yield for 18 year of a 20 year bond with 2 year remaining maturity. We need to calculate 3 year (5(class interval of 5,10,15,20 year bond)-2) bond yield and add with 15 year bond to dig up the 18 year bond yield  $(18=15+3).15\text{year yield}(11.4200\%) + ((20 \text{ year yield}(11.9645\%) - 15 \text{ year yield}(11.4200\%))/20 - 15) \times \text{period remaining}(3 \text{ year}). 11.4200 + (((11.9645 - 11.4200)/5) \times 3) = 11.7467\%$ .

### Calculation procedure of treasury bill

In a particular auction, the banks **Offer price** can be calculated as:

**99.50**  $= (365 \times 100 \times 100) / ((91 \times 2.02) + (365 \times 100))$ . The banks deposit discount amount Tk.99.50 with an implicit yield of 2.02% and get the full amount Tk.100 at the end of 91 day. The Implicit yield (**2.02%**) can be calculated as:  $[(100 - 99.5000 (\text{offer price})) \times 365 \times 100] / (99.5000(\text{offer price}) \times 91)$  (remaining maturity of the bill). The auction committee determines the cut-off price of Treasury Bills considering the liquidity and macroeconomic situation. The successful bidders receive T. Bill according to their submitted bid. This Bill and Treasury Bonds can be used as held to maturity (HTM) and held for trade (HFT) purpose. The banks can also use this Bill including Bonds for getting repo facility from the BB. They can also participate in the inter-bank repo along with over the counter (OTC) trade.

### Bond Pricing (yield based multiple price auction)

In order to get bond price we can use the insert function of Microsoft Excel menu selecting Price option (settlement, maturity, rate, yield, redemption, frequency, basis). Incorporating relevant data in the particular field we obtain the **Price (15-Feb-12,15-Feb-17,10%,10%,100,2,1)**. As the rate (10%) and yield is same the price of the bond will be Tk.100. Deviation of yield from rate will generate different price, which may be lower or higher than Tk.100.

### Reissue for government treasury bond and impact on liquidity

Government also issue and reissue the Treasury bonds with a half yearly coupon. The auction committee comprising government and BB high officials determine

Here,

Settlement= Security's settlement date: **15-Feb-12** (on which the security is bought or sold: 1 day added for leap year).

Maturity= Maturity date: **15-Feb-17** (the date when security expires).

Rate= Security's annual coupon rate: **10%** (cut off yield rate of particular auction).

Yield= Security's annual yield: **10%** (quoted by the bidder in a particular auction).

Redemption= **100** (face value).

Frequency= **2** (for semi-annual coupon rate).

Basis= **1** (actual/actual).

the cut-off rate of a specific auction. If the cut-off rate is 10% then the banks will get 5% interest (10%/2) as coupon after 6-month and at the end of the bond maturity bond holder will get back principal amount say Tk. 100 plus the last coupon. In case of reissue of Bond the mechanism is different. In such case the auction committee determine the cut-off price, which is known as clean price Tk.99.5550 (**Table**). If the original issue date is April 27, 2016 and reissue auction date is May 24, 2016 then bank need to pay 28 days interest. This is known as dirty price. After six months the bank will receive full amount of coupon including 28 days paid interest. If the reissue coupon rate is 7.79% and auction offered yield is 7.84% (**Table-16**) then bank need to pay less amount equivalent to Tk.445,000.00 [ $Tk.100000000 - ((Tk.100000000 \times 99.5550) / 100)$ ]. As the bond is reissued the bond holder need to pay for final settlement according to dirty price. The dirty price can be calculated as:  $99.5550 + 0.5976 = Tk.100.1526$ . The 28 days interest arrived as Tk.597589. The calculation procedure of this amount (Tk.597589) is:  $(Tk.100000000 \times 0.0779 \text{ (reissue rate)} / 365) \times 28$  days interest. In arriving dirty price we need to divide Tk.597589 by Tk.100000000 then multiply it with 100, which will result 0.5976. Consequently, the settlement price will be Tk. 100,152,600. This can be solved as:  $(100000000 \times 100.1526) / 100$ .

Here, as it is reissue the bidder needs to follow dirty price (100.1526) for making settlement price. In this exercise we observe that there is inverse relation between interest rate and bond price. If the interest rate goes down the price of Bond will go up and the book value will rise. In case of rising interest rate the bond price will fall and the book value will decline creating duration gap of bond. The mismatch of assets and liabilities of bank increases the duration gap. If the duration gap is negative then the bank need to issue new share or the owner of the bank need to add capital to reduce the asset and liability gap. Thus vulnerability

Table: Reissue of 15 year BGTB; coupon rate 7.79% (April 27, 2016)

Name	Offered amount	Allotment amount	Accepted Price (clean price per Tk. 100)	Offered yield	Discount	Accrued interest (from 27/4/16 to 24/5/16)	Dirty price	Settlement amount
Citibank N.A	100000000	100000000	99.5550	7.84%	445,000	597589	100.1526	100,152,600

of bank can be monitored observing Duration gap. Depending on overall liquidity and macroeconomic situation BB prudently determine the cut-off rate for balancing call money rate, exchange rate, inflation and GDP growth.

Lower interest rates of yield curve exemplify higher book value of HFT securities of banks and financial institutions in their trading books. The derived yield curve is upward sloping because the longer maturity is bearing higher interest rate and the yield curve is showing positive expectation about the future. Following the agenda below liquidity and yield can be improved for better functioning secondary market in Bangladesh.

#### **Improving transmission mechanism**

- Strengthening domestic debt market
- Cleaning BB's balance sheet
- Improving corporate governance
- Improving payment System (RTGS)

#### **Development of policy instruments for Islamic banks**

##### **The Stability of financial sector**

- Macro-prudential policies
- Transaction Matrices
- Stress test
- Cyclical Capital Buffer
- Implementation of Basel-III

BB would like to strengthen its financial inclusion drive further.

##### **Accountability to the Government (Ministry of Finance)**

- Coordination Council Meeting

##### **To the Parliament:**

- Replies to members' questions

##### **Accountability to Public:**

- Release of MPS, Annual Report
- Other Publications of BB

#### **Section IV**

##### **Conclusion**

In-depth analysis on government treasury bills and bonds pricing will contribute in developing secondary market in Bangladesh. Central bank and banks treasury altogether can act as a catalyst to create attention about the government debt management tools. Bills and bonds are used as an underlying asset for getting repo facility from the central bank. Banks also use these instruments in case of inter-bank repo mitigating liquidity need. Thus calculated risk issue for yield curve can impact the banks trading book with a better functioning of treasury through effective amortization. The applications of government treasury bills and bonds are multidimensional as bills and bonds pricing is concern. At the same time, the paper observes that country's uncalculated risk such as geopolitical risk can be reduced with substantial foreign exchange reserves.

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## Population Growth and Environmental Degradation: The Case of Bangladesh

SHISHIR REZA\*

**Abstract:** *Men are an economic agent whose economic pursuits take place within a socio-economic set up – the economy where the natural environment provides resources for the socio-economic activities of the people. These activities may have negative impacts on the quality of the environment leading to environmental degradation. Conducted on analysis of changes and trends over the last 10 years– the study implies that the rapid population growth in Bangladesh is threatening our environmental management through the expansion and intensification of agriculture, uncontrolled growth of urbanization, industrialization and the holistic destruction of ecological settlement. The natural resources are under increasing strain, even though majority of the people survive at subsistence level. This analysis also reveals that the outcome of high population growth rates is increasing population density in different cities and number of people below poverty line in Bangladesh. The increasing population numbers and growing affluence have already resulted in rapid growth of energy production and consumption in Bangladesh. Besides, the rate of population growth leads to degenerate arable lands, air, surface & ground water, forest ecology which are collectively responsible for great disaster. This study highlights the present status of population and environmental degradation in Bangladesh– may assert some proposals to combine population status and environmental development and turning it into a praiseworthy consequence.*

**Keywords:** *Over population of Bangladesh, Environment, Management, Development Degradation.*

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\* Assistant Director, Bangladesh Bank, E-mail: shishirmjs@gmail.com

## 1. Introduction

Bangladesh is a lower middle country in South Asia with lot of possibilities due to her potential even if there are some crucial challenges. Over the last twenty years, Bangladesh has accelerated economic growth in order to meet the demands of fast growing population with limited space and natural resources since the independence of the country<sup>1</sup>. Bangladesh got healthier position for providing proper sanitation and developing maternal health status regarding Millennium development goals (MDG's). The percentages of people living in poverty declined are 23.05%, extreme poverty rate 12.1%. Our life expectancy is now 70 years, Foreign exchange reserves 32 billion \$; remittance 15.27 billion \$; our export is 34.24 billion\$ (2015-16); per capita income 1466 \$; gross domestic product growth is now 7.11%. Now the country has attained a consistent growth in different sectors such as industrialization, infrastructure development, education, health care, food productivity, social safety net, tourism etc. However, such sectorial development merely embraced protection of natural resources and environmental management practices in the development history of the country as the high population pressure is a big challenge. We know human beings are an essential part of biological environment. The permanent life-cycle of human being is depended on proper interconnection between natural environment and men. But the direct and indirect impact of population degrades our local, national, regional and international environmental equilibrium day by day. Due to the high demand of food, our agricultural systems are shifting – intensive where more use of chemical fertilizers, pesticides degrading the soil profile, texture, structure, fertility and specially the ecosystem services. Unrestrained dumping of solid, liquid industrial waste makes our water body polluted. Different industries and factories emit inimical gas makes our air contaminated. Commercial cultivation, human settlements in forest area degrades our forest biodiversity. Most of the time we have seen, rural to urban migration, environmental deterioration, food insecurity are caused by climate change, according to concerned authority. But the crises are closely related to land encroachment in forest, clash in char-land, river encroachment, deforestation, violation of eco-industrial laws –anthropogenic basically. Population Pressures on natural resources– also created by expansion via housing, huge water demands, use of arable and wild environment. Sewage is a great risk to water table and a disease threat for people if not well managed. Presence of hysterical electricity cables and the land use for poles, Street lights,

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1. Reza, S and Sharmin, D. (2016). "A Comparative Study of Environmental Management Strategies in Japan and Bangladesh", *Social Science Review*, University of Dhaka.

WiFi, block the natural movement of animals, bird and insects. The demand-supply theory of economics regarding Plastic or synthetic materials in modern society are not encouraging to environment wellbeing. On the other hand, uncontrolled industrialization, shrinking of our agricultural land, Concern of adulterate food has created a new dimension in Bangladesh. Day by day, the rate of energy (gas, oil, coal, mineral) consumption is rising. As a result, our total environmental health– the stability of biosphere, atmosphere, hydrosphere, and lithosphere is now under threat. The question is, how many days the triumph-history of human being will be continued? Aren't human beings themselves enemies of themselves?

## 2. Population Growth and Environmental Degradation: Meaning and Relation

Population growth is the main cause of the socio-economic problem including environmental degradation, pollution, desertification, deforestation, intensive cultivation, over utilization of grazing and other environmental problems. But population growth may not always deter development and not deteriorate natural resources. For example, some of the most crowded countries in East Asia are the most prosperous – Taiwan, South Korea, Hong Kong and Singapore where the population density is 1000 people / sq.km. It depends on what policies they have taken and the public participation. However, Bangladesh is the 9<sup>th</sup> most populous country in the world. Population density implies as the number of persons per sq. km which is 1251 now. Population growth rate is 1.17%, total population 168 million, Birth's per day 1706, Death's per day 473(Average). The indicators of population status are population growth, life expectancy, crude birth rate, crude death rate, total fertility rate ( 15-49 years, considering in Bangladesh) etc. A population scenario of Bangladesh<sup>2</sup> is given below:

Year	Population	Male (%)	Female (%)	Density(km <sup>2</sup> )	Growth Rate (%)
2016	162,410,864	50.4	49.5	1251	1.17
2015	160,995,642	50.4	49.5	1236	1.18
2010	151,616,777	50.5	49.4	1164	1.17
2005	142,929,979	50.9	49.0	1098	1.33
2000	131,280,789	51.0	48.9	1008	1.88

(Source: Economic and Social Affairs, Population Division, UN, 2016)

<sup>2</sup>. World Population Prospects-global Demographic Estimates and Projections by United Nations, 2016

Over the last couple of decades, the country has been grappled with a series of environmental deterioration by means of land encroachment at forest, destruction of wetlands and inland fisheries, surface and groundwater pollution, soil nutrient depletion, inland salinity intrusion, natural calamities like floods, cyclones, tidal surges and tornadoes have resulted in severe socio-economic and environmental damage (MoEF, 1992) by a combination of natural/anthropogenic factors. Although the country is making some efforts to resolve some of these environmental issues, no efforts will be adequate to face these challenges without identifying the underlying causes nationally and addressing them locally. Some of these root causes are strong broad based social movement for environmental protection, lack of understanding of ecological principles, poverty and lack of adequate alternate resources.

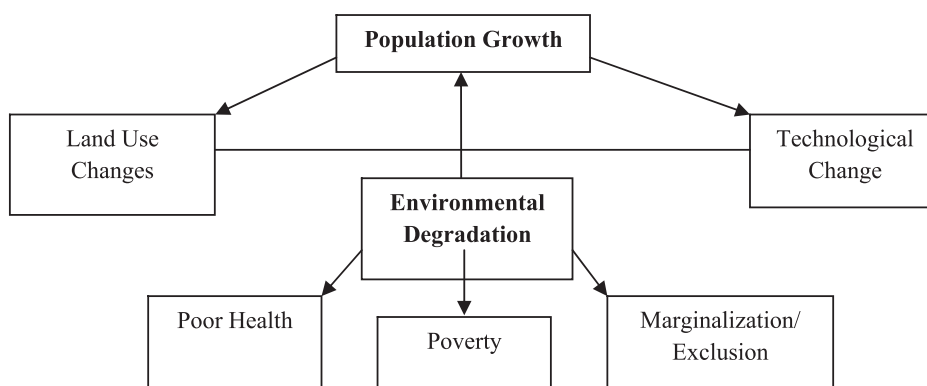


Figure 1: Relation between Population & Environmental Degradation  
(Source: Author)

Environmental degradation simply means overall lowering of environmental qualities because of adverse changes brought by human activities. The relationship as it stands today between man and environment is that man's dominance over nature and that of overexploitation and misuse of environment to the extent that it is now degraded (Zinatunnessa, 2001). Men causes environmental instability by destroying the natural vegetation or original species or replacing them by other vegetation or animal species, by altering or modifying one or more components of natural environment, by introducing foreign substances through the use of chemical fertilizers, pesticides or herbicides, by altering chemical and gaseous composition of the atmosphere through unplanned industrialization and uncontrolled urbanization. Human intercession in the justifiable functioning of the natural environment may occur to increase

productivity and to meet consumption needs, e.g. construction of dams, filling up wetlands, canals, lakes, ponds etc. These activities bring about both physical and functional changes in the natural state, in that way disrupting the ecological balance leading to degradation of the environment. It should be noted that population size or population growth can not accurately predict the impact of environmental damage on the economy of a country. The average impact of a person who lives in the United States is much greater than the impact of a person lives in a low technology society. But even in a lower middle income, low technology nation like Bangladesh, the sheer number of people leads to large scale environmental effects. According to Ehrlich and Holdren (1971), the total impact of human population on environment can be determined by this way;

**Environmental Impact** = (Population size) × (Per capita affluence level) × (Impact from the technologies used to achieve that level of per capita affluence)

### 3. Population Growth, Poverty and Environmental Displacement

In 2000, the world population had reached 6 billion and in 2010, it was 7 billion, by 2015, it will be 8 billion and it will reach 9 billion within 2050. Over 90% of this growth will be in developing countries. So, of course there will be increased demand for food and for all other necessities of life. When this demand exceeds the sustainable production of agricultural lands, forests and aquatic regimes, the resource base itself will be eroded. Although the growth rate of population in Bangladesh is seen to be falling, its size is already large. Projections of Population with density of Bangladesh:

Year	Population	Density (Km <sup>2</sup> )
2020	170,466,782	1309
2025	179,063,375	1375
2030	186,459,898	1432
2035	192,500,115	1478
2040	197,133,813	1514
2045	200,380,556	1539
2050	202,209,053	1553

(Source: Economic and Social Affairs, Population Division, UN, 2016)

As a result, at rural areas— commercialization of agriculture<sup>3</sup>, contract farming, commercial cultivation in forest area, hill cutting, extraction and depletion of groundwater, land degradation, shrimp farming by encroaching crop fields as well as at urban areas— inadequate and poor housing, slumization<sup>4</sup> (about 35% people city dwellers are living in over 1300 slums in Dhaka city), urban waste generation, poor sanitation, lower quality of waste/effluent treatment systems, air & water pollution, faulty transport system both has already accelerated environmental degradation of our country.

Population growth worsens the poverty situation of a county. There is already an inequitable distribution of income and assets. The poor are living in a poverty trap. Their income is low and they lack productive assets (Zinatunnessa, 2001). We know the socio-economic condition of marginal, indigenous and religious minority peoples of Bangladesh. At this case, political economy is saying, such kind of discrimination or disparity is created by free-market economy where marginal people are powerless and they do not get any platform to show their problems. This is called relation between center-periphery relation while center is actively involved to exploit or dominate the people of periphery or make the people more marginal. It is a culture of demographic engineering under the system of political engineering. This makes them vulnerable to different types of crisis situation. In Bangladesh, 35 million people still live below the poverty line and the number of rural poor has increased. Subdivision of productive agricultural lands from one generation to another has increased the number of marginal farmers and rural landless. As population grows, their numbers will also increase. Lacking assets, they will look to nature for their survival. *“Poverty drives ecological deterioration when desperate people overexploit their resource base sacrificing their future to salvage the present (Durning, 1990; pp-144/145)”*. People push into fragile ecosystems. They till marginal lands, destroy forests, overfish and overgraze. We know the existence of human being is dependent upon the food chain created by flora and fauna. But overuse of these natural resources is mainly responsible for loss of biodiversity. Such activities go over the carrying capacity of the local environment. If it continues, our total ecosystem will damage. The deteriorated ecosystem is less productive and has less to offer to the people who are dependent on it. Thus, the poverty trap only deepens. The urban

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3. Barkat, A., G.M. Suhrawardy and A. Osman. (2015). Increasing Commercialization of Agriculture Land and Contract Farming in Bangladesh, Dhaka: Association for Land Reform and Development.

4. Barkat, A and akhter, S (2001). “A Mushrooming Population: The Threat of Slumization of Urbanization in Bangladesh, Harvard Asia Pacific Review, V.5, Issue 1.

poor are in no better conditions. The rapid increase of population in the urban areas is changing the scenario of housing, sanitation, water, energy and living condition. They live in slums under unhealthy and unsanitary conditions. As they do not have enough sewerage systems and garbage disposal facilities, the wastes generated by their day to day living only help pollute their environment. Besides, environmental displacement is alarming for Bangladesh. The factors can be either natural or anthropogenic. Floods, severe cyclones, water logging, salinity intrusions, droughts and river bank erosion which induce mass population displacement. By the year of 2020, 78 million people can be displaced (Tahera, 2009).

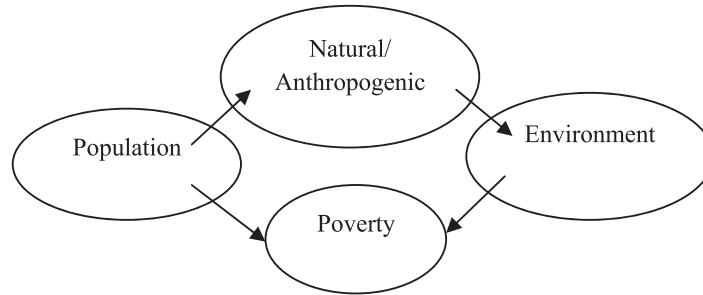


Figure 2: Environmental Displacement (Source: Author)

On the other hand, displacement can be in such ways– vested property act, migration politics, demographic engineering, ethnic conflict, anti agricultural product pricing system, political influence of rent-seekers.

### 3.1 Economic Growth, Environment and Sustainability

Economic pursuits of human beings are dependent on the natural environment as nature is the provider of raw materials for the production of different goods. Natural environment provides us two types of resources. Natural or material resources– mineral and fossilized energy which are extracted from the natural state at some cost to the economic agent who is involved in the extraction of the resource as well as environmental resources– clean air, water, rivers, natural beauty, oceans etc. the use of these does not involve any payment as there is no market for natural goods. Besides, natural environment works as a waste assimilator as the wastes are discharged into the natural environment without anybody having to pay for it. On the other hand, modern technology increases the use of resources and also enables us to affect the environment in many ways. Before the invention of CFC's, used as propellants in spray cans and as coolants

in refrigerators and air conditions, we were not causing depletion. Economic activities of human being and their impacts on environment are given below:

Economic Activities	Impacts on Environment
Land development for industries, housing, brick fields	Loss of fertile agricultural land
Construction of buildings, roads in unsustainable ways	Soil erosion, destruction of hill ecosystem, topographic level
Solid wastes disposal by households, industries and hospitals	Land degradation
Wastes and effluents discharged by different industries	Water pollution, lack of safe drinking water, groundwater pollution
Emission of inimical gases, ashes, particles from industries and transportation	Air pollution
Industries and transportation	Noise pollution
Over pulling out of water for consumption	Depletion of groundwater, fall in water table, heavy metals or arsenic contamination
Unplanned construction of high rise buildings	Crowded neighborhoods, overloaded utilities
Unplanned land use changes	Lack of open space, heat island

(Source: Author)

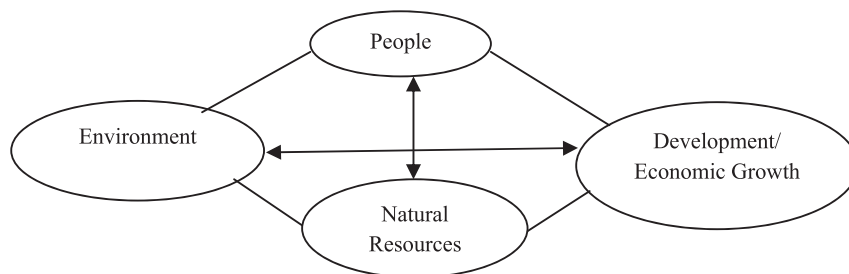


Figure 3: Primary linkages of Population, Environment & Economic Growth

(Source: BCAS, 1998)

We can consider the use of energy resource such as coal in the generation of power. The combustion of coal produces heat that generates power and the wastes such as carbon dioxide is released into the atmosphere and the solid wastes are disposed of on land. The environment has the capability of transforming some of these wastes into useful products – tree converts carbon dioxide into carbohydrates through photosynthesis. The wastes may also be harmless through



biogeochemical processes. These reflect the waste assimilative capacity of the environment. As a result, economic activities do not overload the assimilative capacity of environment. However, when too many wastes are discharged into a specific environment, it cannot assimilate all these and there is environmental pollution. Pollution induces the negative externality<sup>5</sup> which is unsustainable to society, economy and environment.

It is common that, agricultural production increases arithmetically and population increases geo-metrically. Increasing population growth at first rate mainly in the developing countries has put enormous pressure on forested land because it becomes necessarily to clear the virgin forest covers and convert them into agricultural land so that agricultural production may be significantly increased and food may be provided to hungry human population. This trend has resulted into large scale destruction of savanna vegetation in the subtropical region, rich and extensive grasslands of Russian 'steppes', South American pampas, Newzelandean native forests, has been extensively converted to agricultural farms and these areas have now become major granaries of the world. We can compare the different countries status in terms of environmental security, economic growth and sustainability;

**America, Japan, Canada, Australia, France, and Germany** - are in first category. They are involved in high quality research; ensure the public participation in environmental management.

**China, Malaysia, India, Brazil and Vietnam**- are in second category. They are developing their institutional and technical capability to combine economic growth and environmental security.

**Paraguay, Venezuela, Bolivia, Ecuador and Argentina**- established ownership of natural resources with a strong movement of the people and trying to develop economic status, environmental condition.

**Sudan, Nigeria, Zimbabwe, Zambia, Angola, Sierra Leone and Columbia**- the people are victims of different imperialistic countries and multinational companies, local corporate grabbers and rent-seekers. Basically they do not know what their own resources are. General people are deprived to use of their own resources. Here the main question is "FOOD"; as a result environment is not main concern.

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<sup>5</sup>. Dorfman, R and Nancy, S. (1997). " Economics of the Environment Selected Readings; W. W. Norton and Company Inc. Newyork

We want development, high per capita income, and economic growth. But the term ‘Development’ does not carry the same connotation for all— upper, middle, lower, marginal, indigenous, religious minorities. Either the extraction of development enriches the majority of people or makes some people rent-seekers. It depends on the patterns of development and public participation. Environmental Kuznets curve<sup>6</sup> implies us how per capita income of any country increases the pollution, contamination, degradation level.

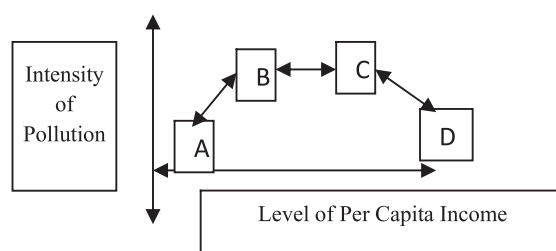


Figure 4: Environmental Kuznets Curve (EKC)

When the natural resources and its development, management transfer to private or business level then degradation occurs. When the environmental resources – air, water, land, forest, hill, and wetland are affected by corporate grabbers and where the environmental laws, policies, management strategies are at rudimentary stage, then environmental insecurity, pollution, contamination level increases. Regarding the population growth, it is possible to amalgamate economic augmentation and environmental sustainability but it needs prior green-economic reform.

#### 4. Environmental Challenges in Bangladesh

Population growth and the development patterns of “Neo-liberalism” are contributing too many serious environmental problems in Bangladesh. These include land degradation, water insecurity, high demand for energy, air pollution, land encroachment, loss of biodiversity, habitat destruction, and urban migration, lower quality of environmental sanitation, solid wastes generation.

##### 4.1 Energy: Rising Demand

Population pressure has imposed relentless strain on non-renewable and conventional energy resources like fossil fuel (coal, petroleum, natural gas) and

<sup>6</sup>. Clem Tisdell (2011); will Bangladesh’s Economic Growth Solve its Environmental Problems ? Economics, Ecology and Environment, University of Queensland.

mineral resources such as iron, copper, lead, silver and gold. On the other hand, the increasing consumption of fossil fuel for domestic, industrial needs, transport has generated air pollution and health hazards particularly in cities and industrial areas. According to Energy Policy, 1996; “Ensure environmentally sound sustainable energy development programs causing minimum damage to environment”. Energy Consumption in Bangladesh:

Energy Sources	2000	2010	2020	2030
Natural Gas	7.7 %	14.2 %	22.9 %	33.6 %
Oil	3.2 %	5.9 %	8.9 %	12.1 %
Coal	0.3 %	0.6 %	1.3 %	3.0 %
Renewable	0.1 %	0.2 %	0.5 %	0.7 %
<b>Total</b>	11.3 %	20.9 %	33.6 %	49.4 %

(Source: GDRC- Gas Demand and Resource Committee)

#### 4.2 Urban Health and Environmental Sanitation

A major challenge faced by the developing countries is that of human waste management and disposal. The primary concern is the amount of money that is required for proper management and disposal of human wastes. It is important to understand that the improvement of health is not possible without sanitary disposal of human excreta. There are some Problems of groundwater development in Bangladesh. Such as, arsenic in groundwater, excessive dissolved iron, Salinity in coastal areas, water table is lowering due to over-exploitation of groundwater for irrigation and intensive cropping. The urban area is a composite of different subsystems of physical structures and human activities all having links with one another. Growth in the urban population of Bangladesh is more or less centered on the three metropolitan areas of Dhaka, Chittagong and Khulna. It can be 38% of the total population by the year of 2020. Economically affected, socially excluded and environmentally displaced people will join in urban area as beggar, hotel worker, porters, day laborers, maid servant, rickshaw puller, petty traders etc.

Migration	Rate (%)
Urban to Rural	1.10
Rural to Rural	3.42
Rural to Urban	51.8
Urban to Urban	4.36

(Barkat, 2001)

Year	Population	Percentage (%)
2016	56,856,665	34.9
2015	54,983,919	34.2
2010	46,035,276	30.4
2005	38,373,642	26.8
2000	31,229,852	23.8

(Source: Economic and Social Affairs, Population Division, UN, 2016)

Dhaka has a population 14.4 million and density of 19,447 people per square miles. Urban Population Status in Bangladesh:

Planned and unplanned human activities taking place within the urban area have profound impacts both within and outside it. The degradation in the quality of the urban environment is the consequence of these economic activities, which may affect the environment either directly or indirectly. For sustainable urban health, the environmental sanitation through environmental education can play key role.

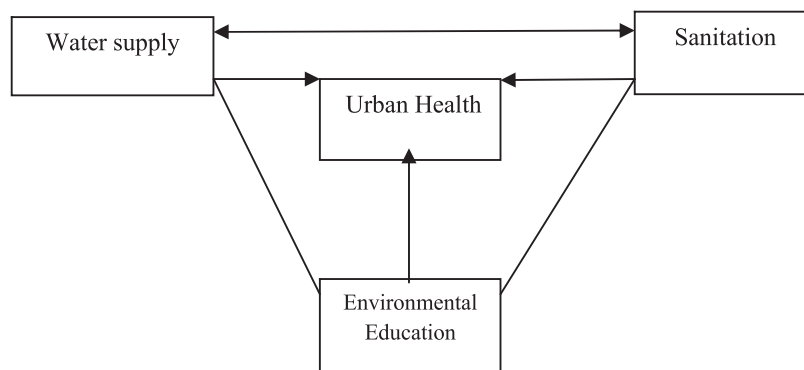


Figure 4: Urban Health Sanitation Nexus (Source: Author)

In urban poor areas among the latrines, pit latrine with slab without lid and water-seal is the major one (53%). Pit latrine with slab and water-seal is 13 per cent. Use of other types of improved latrines is relatively low. Pit latrine with slab and flap without water-seal is 8 per cent. 'Latrine without slab or open pit latrine' is 7 per cent. Latrine connected with open drain with flush or pouring water is 5 per cent. Use of hanging latrines is 3 per cent (Barkat, 2013).

### 4.3 Land degradation

Agriculture land availability declined at 0.26% annually between 1976 and 2010. Arable Land (hectares) per person in Bangladesh was last measured at 0.05 in

Sectors	Percentage (%)
Agriculture	50
Urban	15
Tea/Rubber	2
Village Forest	4
Unclassified Forest	7
Classified Forest	13
Social Needs	8

(Source: estimated by Author)

2011. Agricultural land or basically Arable land is decreasing due to the house settlements, uncontrolled industrial development and even in forest area, poor transport and communication systems, rudimentary institutional and technical capacity in exploring and management of energy, power, mining etc. land use patterns in Bangladesh are given below:

As urban population and urban economic activities increase, more land is needed for commercial units. Expansion of the transportation system is an integral part of the urban development. Construction of new roads and widening of existing ones, have become necessary as economic activities disperse over a large area. Increased demand for bricks is the outcome of an expanding construction industry, which follows rapid urbanization. To meet this demand, the number of brickfields keeps on increasing in the outskirts of urban areas. Growing numbers of brickfields mean loss in prime agricultural land. Top soils are reducing around the brickfields. As a result, soil loses the water holding capacity and fertility. On the other hand, Intensive cropping reduces soil nutrients and organic materials as well as wetlands are covered by contract and shrimp farming as we know, food security is given top priority in Bangladesh. Her large and growing population needs a steady supply of food grains. In Chittagong, excavation of hills for the construction of houses and for acquiring earth for leveling land elsewhere is turning the beautiful city into a disaster zone (Zinatunnessa, 2001). The hills of Nasirabad pahartali, lalkhanbazar, baizid bostami and the khulsi area are all threatened by unplanned construction and earth excavation. Besides, in Bangladesh, much of the problems of water logging and salinity have been attributed to the lack of maintenance of existing flood control, drainage, irrigation and poor design and planning of new infrastructure.

#### 4.4 Air pollution

In developing countries where there is no control on emission or where monitoring system is unable, cities are virtual gas chambers where people breathe

in air polluted with high levels of lead, carbon monoxide, carbon dioxide, dust and different types of poisonous gases emitted from industries, construction activities and automobiles. Bangladesh is not out of those activities. The level of air pollution is highest in Dhaka followed by Chittagong and Khulna, the two other industrial cities. Incidence of air pollution is not an isolated event but is a continuous process as the sources of pollution operate throughout the year. The ambient air quality of Dhaka city with respect to CO, SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub> and PM<sub>10</sub> is given below:

Location	Pollutants concentration				
	CO (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )	CO <sub>2</sub> (ppm)
Mohakhali	2519	376	trace	547.66	435
Farmgate	7730	752	trace	289.92	590
Mogbazar	5726	339	trace	383.53	475
Sonargaon	3435	75	trace	161.93	500
Science lab	5726	113	trace	169.64	500

(Source; Ahmed et al, 2010)

There are a lot industries and factories in Dhaka city. Their percentages in air pollution are given below:

Industrial sectors	Contribution (%)
Pulp & paper	13.7
Cements/clay	16.6
Textiles	10.5
Food industry	38.7
Tobacco	4.5

(Source: Islam, et.al. 2001)

Besides, 86% of vehicle in Dhaka city exceed the acceptable limit of emission. Vehicle type- air pollutants are;

Vehicle Type	CO (%)	HC (%)	NO <sub>x</sub> (%)	PM (%)
truck	13.4	8.6	59.7	47.5
bus	10.3	9.7	18.5	29.4
minibus	7.3	3.9	6.5	19.1
car	38.2	18.2	6.5	1.2
Three wheelers	10.6	26.9	6.0	1.2
Motor cycle	14.0	28.3	0.3	1.0

(Source: country profile of environment, Bangladesh, 2006)

#### 4.5 Solid waste generation

Disposal of solid wastes in all the urban areas is inadequate. Household garbage, industrial wastes and infectious wastes from clinics and hospitals are all dumped in the same place. Waste estimation of five hospitals in Dhaka city is given here:

Institutes	Per day/kg/bed/day
Dhaka medical college	1.19
Popular hospital	1.23
Lab Aid	1.20
Salimullah medical college	0.80
Ibne Sina hospital	0.83

(Source: UI/ah, 2006)

Although there are 700 street cleaners in the Dhaka city corporation, most of the streets are never swept. Daily waste produced in Dhaka city is about 3000 metric tons, of which 40% are left on the streets (Daily Star, February, 2000). Nowadays, in south city corporation, 3 thousand 500 tons waste are generated where 1 thousand 900 tons are processed but 1 thousand 600 tons are out of processing. Besides, generation of electronic waste such as, TV, Freez, computers, tube lights, and mobiles has created a new threat for us. According to environment and development organization, 2016; during the period of 2011-12, it was 5 million metric tons and 2013-14, it was 11 million metric tons. However, the rates are increasing day by day in Bangladesh.

#### 4.6 Water Insecurity

Water is an essential part of each and every plant, animal and microbial life. We can hardly live for a few days without water. It is an essential commodity not only for the development of industrial and agricultural development but also it supports ecosystem, biodiversity, economic development, community well being and in cultural values. Average water consumption in Bangladesh:

Water consumption	Liter/per capita/day
Commercial use	40
Industrial use	20
Public use	25
livestock	20
Loss & damage	40

(Firoze and Ahmed, 2005)

However, in our country, quality of water is decreasing day by day due to the large and rapidly growing population; unplanned industrial pollution; improper use of agricultural chemicals and pesticides; indiscriminate disposal of municipal, industrial and agricultural wastes enter into the inland water systems, poorly designed flood control, drainage and irrigation works, lack of adequate regulatory measures and institutional setup for proper monitoring and control etc. According to Asian water development outlook, 2016; 80% wastes are dumping into river in Bangladesh as well as water security index, Bangladesh is 44<sup>th</sup> out of 48 countries. Every day four thousand tons solid waste & 22 thousand tannery waste mixes with water in Buriganga River While lot of heavy metals-copper, iron, lead, nickel are contaminated the water. Different industries and their contribution in pollution are given here:

Industrial sectors	Contribution (%)
Pulp & paper	47.4
pharmaceuticals	15.9
Metals	14.0
Food industry	12.1
Fertilizers/pesticides	6.6

(Source: Islam, et.al. 2001)

At present, around 250 industries are discharging chemical pollutants into Buriganga and Sitalakka River (Reza, et. al, 2016). If we think urban areas, the groundwater laced with harmful chemicals may then be supplied to urban dwellers who are unknowingly exposed to health hazards. Besides, another source of water pollution is discharge of sewage directly into the rivers and low-lying part around the urban areas. This is happening in all the cities of Bangladesh. Eutrophication and bacterial content in lakes and rivers are also high. This is a threat to the health of urban dwellers as river water is also supplied by the “Water Supply & Sewerage Authority” for drinking and other purposes. On the other hand, reduction of river water flow due to siltation is increasing salinity at the coastal areas. Shrimp farming creates more salinity at agricultural land which is 80% in Khulna, Satkhira and Bagerhat districts.

#### **4.7 Land Encroachment, Habitat Destruction and Forest Biodiversity**

Bangladesh has three types of forest ecosystems including the extensive mangrove forests in the southwestern region. All these are already degraded and their area has been shrinking continuously over the years as population continues to grow. Out of 46,000 acres in Madhupur Sal forest, 7,800 acres have been given



out to Commercial plantation, 25,000 acres has given into illegal possession. According to the Forest Division of Tangail region, Encroached forest area in various Ranges in this forest:

Range	Encroached forest area in Acres		
	Garo	Bangali	Total
Dokhola	3700.46	7748.16	11448.62
Central National Park	2247.78	1571.82	3819.60
Madhupur	461.92	3476.29	3938.21
Arankhola	301.72	1709.20	2010.92

(Source: Bangladesh environmental lawyers association, 2007)

At hilly forest area, tobacco farming is increasing rather than the mainstream food. About 10 national and international companies are involved in tobacco farming. In 2000, about 300 hectares land was used which has increased 4232 hectares in 2010. Now the farming area is about 10,000 hectares. The overall condition of Bandarban district:

Bandarban( Hilly district)	
Lama	Alikodom
1. Total tobacco cultivated land is 5 thousands and 399 acres	1. Total tobacco cultivated land is 1 thousand 812 acres
2. Previously, those land were suitable for 21 food crops	2. Previously, those land were suitable for 23 food crops
3. The amount of these food crops is about 11 cores tk.	3. The amount of these food crops is about 3 cores 78 lacs tk.

(Source: Investigation 360<sup>0</sup>, Jamuna Television, 2015)

Nowadays commercial cultivation has become a prevalent fact which is related to the intensive agricultural system. Forest areas are not out of intensive cultivation because of land encroachment and growing population rather forest areas are going under the suppression of commercial cultivation because at Sal forest, native plant species like kumbi, koroi, banza, sheura, jalpai, amloki, bohera are being replaced by alien species like rubber, acacia, eucalyptus, pine apple, teak etc. Similarly at Hill forest, native plant species like telsur, garjan, koroi, chapalish, dhundal are being replaced by tobacco, sugarcane, cotton, turmeric, groundnut, maize, teak etc.

On the other hand, shrimp farming has increased the rate of land encroachment more than double from 45,596 hectares in 2000 to 96,283 hectares in 2010 at

Mangrove forest area (Reza. S, 2016). In Sundarban, the total areas are decreasing:

Sal Forest		Hill Forest	
Native	Alien	Native	Alien
Kumbi	Rubber	Telsur	Sugercane
Koroi	Acacia	Garjan	Cotton
Banza	Eucalyptus	Koroi	Tobacco
Sheora	Pine apple	Chapalish	Maize

(Source: Reza. S, 2016)

In 1959, the total plants were 296 per hectare, 180 in 1983, and 144 in 1996 and it will reach 109 within 2020. Besides, Sundri trees were 211 per hectare (1959), 125 (1983), 106 (1996) and it will be 80 by the year of 2020 (Prothom Alo, September, 3, 2016). Many of country's mammals, birds and reptiles have already been lost. Such as, one-horned rhinoceros, Asiatic rhinoceros, Javan rhinoceros, blue bull, wild buffalo, gaur, banteng, swamp deer, marbled cat, pink headed duck, common peafowl, marsh crocodile ( Rahman, 2008).

Year	Sq.km
1776	11,256
1841	9,279
2015	5,467

Commercial plantation and illegal possession in Sal forest and inappropriate jhumming, illegal logging, stone exploitation, brick fields, Bengali expansionism in Hill forest as well as apiculture, shrimp by catching and animals hunting in Mangrove forest area - all issues are raising a concern about conservation of forest biodiversity. In resulting, land encroachment by local elites or corporate grabbers in the name of agricultural development and industrialization, affects the totality of genetic potential, species and ecosystem stability, degrades the humus and topsoil, changes the food chain, decreases the capability of hydrological cycles and circulation of nutrients as well as the aesthetic value of forest in Bangladesh.

Besides, Bangladesh was known for its variety of fishes. Fish was available everywhere and in all seasons. The main source of protein for the people of the country was fish. Population growth has led to overfishing in almost fisheries in the country. Many species of fish are now extinct. The scenic beauty of different islands is degrading due to over exploitation of fisheries, population growth, and

unregulated tourism activities. Wetlands are used for rice production or filled up with earth for construction purposes.

## **8. Conclusion and Recommendations**

Human Resource Management is a great challenge to combine population and environmental status. Population size cannot be a problem on environment if we convert human capital to human resources through home grown development philosophy. Sustainable development will not be possible if thoughtful efforts are not made to educate people regarding environment. Curricula of educational institutional should be premeditated to incorporate facts about the environment. To press forward awareness and to motivate people to protect the environment that sustains them, dissemination of environmental information is needed through mass media. Environmental and social inclusion are impossible without economic development, on the other hand, economic development will not be sustainable without environmental consideration. Regarding the high population size, we need to combine supply of more environmental quality (green technologies) and demand of better environmental quality (income, changes in preferences). Effective family planning, empowerment of women, creative employment generation for the poor is some of the measures for improving condition. Involving people in environment and resource management, biodiversity conservation, developing institutional and technical setting, utilizing indigenous knowledge, implementing environmental laws and policies, improving mental faculty of people can be effective to trim down environmental degradation.

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## Why are there only few Refiners in Bangladesh Sugar Industry?

MOHAMMED HELAL UDDIN\*

**Abstract:** *Refining segment of the sugar industry is highly concentrated with the estimated Herfindahl-Hirschman index of 2936. Identifying the factors behind this concentration will help us understanding the conduct of the traders operating in this layer. Economies of scale and scope have shaped the market structure of the sugar industry. Almost all of the existing refining groups are exploiting the economies of scope in the production/processing of many essential commodities. For a new entrant to be successful in this market, it is necessary that it utilizes the economies of scope and saves on distributional costs. Thus, not only the fixed costs, but also economies of scope may discourage new entry. To compete effectively with multi-product firms with economies of scope new entrants will require far more investment than is required for a sugar refinery only. There has been no new entry or exit in the refining end of the sugar industry for the last several years. The existing six refinery groups in this market are far too many relative to the total domestic demand for refined sugar implying the possibility of further concentration in the future.*

### 1. Introduction

Collusion in some layers of the supply chain and the resulting market power is believed to be responsible for apparent price anomalies in essentials of Bangladesh. Believing in such claims, the government of Bangladesh has banned delivery order (DO) layers for some of the essentials' supply chains alleging that speculative behavior in the DO market is the main culprit to price volatility in these markets. There are numerous investigative studies on this issue in the other

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\* Associate Professor, Department of Economics, University of Dhaka.

countries. Whereas, there has only been few of such systematic efforts in Bangladesh; looking into the market structure and the competition issues for a commodity whose supply is almost entirely import-determined. Recently, **Helal and Taslim** (2010) assess competition in edible oil sector in Bangladesh. They have found concentration in the upper echelon of the supply chain, but no conclusive evidence in support of collusive behavior in any of the layers of the edible oil supply chain. The Centre for Policy Dialogue (**CPD**) undertook a diagnostic study to find out the causes of the recent food inflation. The CPD study claimed collusive behavior on the basis of the small number of importers who operated in the essential commodities market of Bangladesh.

The objective of this study is to gather evidence on the supply chain of sugar and to learn and assemble the relevant facts regarding the causes of concentration, if any, in certain layer of the supply chain. We have chosen the sugar market because it is widely regarded as non-competitive. It is necessary to identify the relevant markets in this sector, their structures and the way they are operating. It is also important to analyze the role of the various stakeholders involved in the entire production and marketing chain of sugar and thereby point toward policies that may effectively tackle the problem of anti-competitive practices, if any. The specific objectives of the study are to:

- Identify the entire supply chain of refined sugar
- Identify the role of the various stakeholders involved in the supply chain, and
- Explore the market structure of the industry especially the refining/importer layer of the supply chain and the factors behind it.

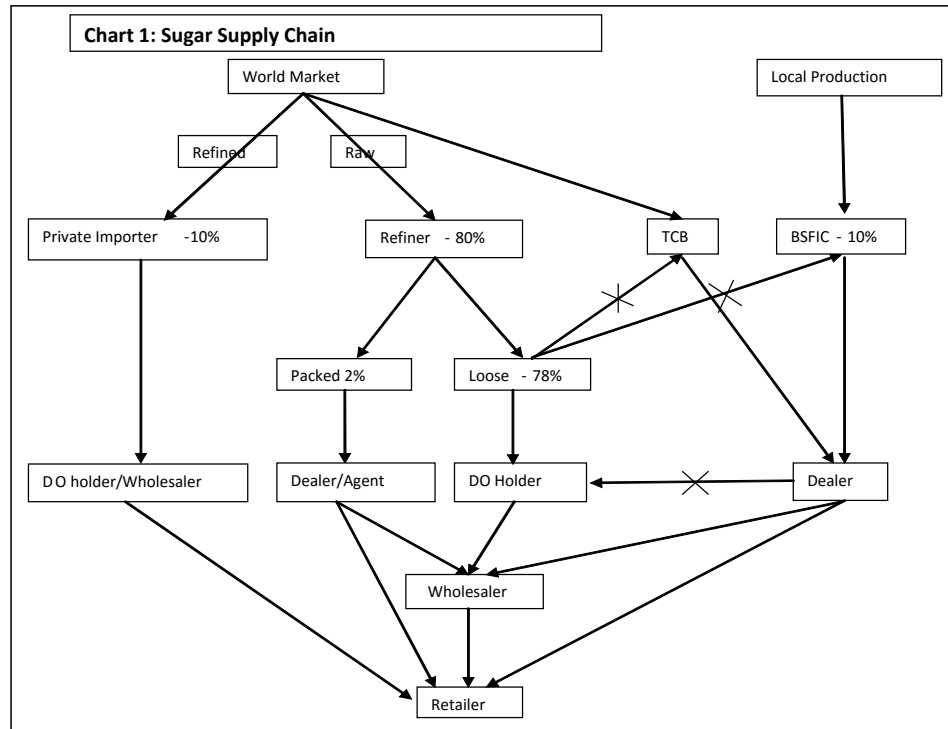
## **2. The Sugar Supply Chain of in Bangladesh**

Before we start analyzing the structure of the industry, it will be helpful to describe the network among different market agents in Bangladesh sugar industry. Once the network or the supply chain is identified we can quantify mark-ups in different layers of the sugar supply chain and assess noncompetitive practices, if any. It is important to note that refined sugar is used in pharmaceutical and other industries beyond household consumption. The focus of this study is refined sugar consumed by households.

The segment of sugar supply chain tracing the route of raw sugar comprises several actors: refiners (who are also the raw sugar importers), DO holders, wholesalers and retailers. A DO is a delivery order issued by the refiner with the quantity of sugar specified on it. As depicted in the Chart, refiners are at the top



of the loose sugar supply chain. They import raw sugar, refine them and then market them in sacks and packs. The refiners distribute sugar through the following two channels:



The refiners sell a document/contract, which is the DO, to the traders. Thereby, they do not exchange sugar physically, but a piece of paper saying they are selling a certain amount of sugar to the traders. These traders are locally known as DO holders. The DO holders sell these DOs to the wholesalers or groups of wholesalers. The wholesalers obtain sugar from the refinery and carry it by trucks. The wholesalers sell sugar to retailers who then sell it to the final consumers. However, a wholesaler can also buy a DO from a refiner directly. Widespread lateral transactions among these DO holders are also in place. The DO layer was banned in the middle of 2011 on the suspicion that DO holders affect prices through widespread speculation and manipulation. But the newly introduced SO system which replaced DO layer is found to work identically. Thus, the only real change is the change of the name of DO to SO. This is why the entire study will use DO in place of SO unless warranted otherwise.

There are two key sources at the top layer who bring sugar in Bangladesh mainly from global market. They are private sector sugar refiners and importers of refined sugar. The private sector sugar refiners import raw sugar and then refine them. Private importers import refined sugar directly from the global market. Besides, Bangladesh Sugar and Food Industries Corporation (BSFIC) produces sugar from domestically produced sugarcane. BSFIC imports refined sugar from the world market when it seems to run low on supply. Trading Corporation of Bangladesh (TCB) also tries to import refined sugar from the world market. Currently, refiners serve about 80% of the total market demand for refined sugar. The BSFIC meets around 10% of the total demand by its own production whereas importers of refined sugar meet the remaining 10%. However, often the share of refined sugar supplied by refiners goes up when the share of sugar from other sources fall.

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- (i) The refiners sell a document/contract, which is the DO, to the traders. Thereby, they do not exchange sugar physically, but a piece of paper saying they are selling a certain amount of sugar to the traders. These traders are locally known as DO holders. The DO holders sell these DOs to the wholesalers or groups of wholesalers. The wholesalers obtain sugar from the refinery and carry it by trucks. The wholesalers sell sugar to retailers who then sell it to the final consumers. However, a wholesaler can also buy a DO from a refiner directly. Widespread lateral transactions among these DO holders are also in place.

This DO layer was banned in the middle of 2011 on the suspicion that DO holders affect prices through widespread speculation and manipulation. But the newly introduced SO system which replaced DO layer is found to work identically. Thus, the only real change is the change of the name of DO to SO. This is why the entire study will use DO in place of SO unless warranted otherwise.

- (ii) Refiners sell packed sugar through agencies. Packed sugar is distributed using the refiners' own vehicles and by their own employed agents. Sometimes these agents can be wholesalers themselves. They sell packed sugar to wholesalers and retailers.

BSFIC produces sugar from locally produced sugarcane Most of which is produced under its own supervision. Production is then distributed through its own appointed dealers. These dealers sell this sugar to wholesalers and retailers. TCB also distribute sugar through dealers, after buying from private refiners or rarely from the world market. Here TCB and BSFIC employ dealers separately. However, often TCB and BSFIC purchase white sugar from private refiners before Ramadan. Dealers sell them to wholesalers and retailers. Private importers of refined sugar sell their sugar to DO holder/wholesalers directly from whom retailers buy. Not very often they sell their imports to Trading Corporation of Bangladesh (TCB). Retailers then purchase imported sugar from wholesalers and sometimes from dealers.

### **3. Refining layer of the supply chain**

As described in section 2.1, the main players at the top layer of sugar supply chain are the private sector sugar refiners. Then BSFIC plays a continuous but limited role at the top layer while private importers of refined sugar and TCB are found to play a limited role occasionally. The amount of sugar produced and supplied by the BSFIC is not substantial compared to the total demand. Despite its supply has the potential to make the government policy makers powerful in regulating the retail prices. This is why we need to look into the ways how this supply is channeled to the customers. For the similar ground, we need to evaluate the role played by TCB in regulating sugar prices during every Ramadan. Also important to look into the role of private importers of refined sugar on the relevant prices.

#### **3.1 Role of BSFIC**

BSFIC has a capacity of around 125,000 tons per year, produced by 15 of its sugar mills. The capacity of each of these mills is 5 to 10 thousand tons per year. The actual production is much less than the installed capacity. Their total production was less than 80,000 tons in 2011 which was only 65,000 tons in 2010. Production phase of these mills start from November/February each year and ends around the month of March/April. They remain in operation for 3 months and idle for 9 months. There is a possibility of expansion of these mills to gain efficiency and refine imported raw sugar to serve the market.

The sugar from these sugar mills are distributed through government designated dealers all over the country. There are 4,500 dealers located all over Bangladesh. These dealers operate at upazila levels. Normally each of them gets 1-2 tons of sugar from BSFIC. This allocation even comes down to 5 to 10 sacks (1 ton is

equivalent of 20 sacks whereas 1 truck is equivalent of 15/16 tons of sugar) per dealer per month. Often when BSFIC is out of stock, they get no allotment at all. Often the dealers do not have incentive to draw allotted sugar because they (allotments) are too small to be picked up by a hired truck. They sell their small allotments to large wholesalers. Those wholesalers then withdraw sugar on behalf of many dealers. Thus, the dealers simply extract rents just because they have dealership license. As a result, this dealership should be cancelled and their role should be replaced by wholesalers.

### **3.2 Role of TCB**

Every time there is a price hike of essentials in Bangladesh, there is one government agency to blame for its failure in discharging its duties, and that is TCB. TCB attempts to contain price hike during every Ramadan through some supply enhancing measures. Often though, we find its measures futile. During the last couple of Ramadan especially during the penultimate one (i.e, Ramadan of 2001), TCB seriously failed to build up a sugar stock when needed.

A few refiners kept their operation closed during that time. There was a huge shortage of sugar in the market. TCB could not import sugar before Ramadan of 2011, and thus it built up a limited stock from domestic sources such as from refiners. As a result, overall stock remained the same. On the other hand, it takes a couple of week time to get that sugar back to the market through the TCB appointed dealers. As a consequence, TCB operation rather worsened the situation. It happened due to its limited autonomy, lack of funding and above all its lack of skill manpower.

### **3.3 Role of private importers**

Private importers do not always operate in the market. Neither do they operate every year. Of course, they follow the market and some of them are active in another segment of the supply chain. Their role as importers however goes off and on. Whenever there is a shock in the domestic and/or world market they become active as importers. Forecasting about the market leads them to import refined sugar. When they expect higher prices of locally refined sugar, they start importing refined sugar. The question is how do they forecast about the price of locally refined/produced sugar? When they realize that local producers have small compile of raw sugar from the world market for various reasons, they sense a potential crisis in the local market. Sensing this, they start importing white sugar directly (mostly from India) at lower prices. In that sense, they play a vital role in stabilizing the sugar market in Bangladesh.

There are many importers who import refined sugar directly. Among them, S. Alam (Chittagong), Masud Brothers (Chittagong), Aman Group (Sirajganj), and Nurul Alam Master (Chittagong) are big players. Private importers sell their imported refined sugar to large wholesalers who also buy DOs to draw sugar from private refiners and sell them to the downstream wholesalers. It is worth mentioning that locally refined sugar is a little bit more crystal clear than the imported one.

The total amount of import by the private importers is around 5-7% of the total sugar demand. As mentioned earlier, they do not import refined sugar every year. They have imported 120,000 tons in the last 5 months of 2011. The largest import by a single player, S. Alam, was 80,000 tons. There was no import of refined sugar in previous couple of years. Before 2011, the last import of refined sugar was during 2007- 08. The imports of refined sugar in our country are mostly done from India; about 70% of total import. The rest comes from Brazil.

Apparently, these players, with a very small and occasional supply of sugar, are not expected to exert a significant influence on the relevant prices. It is the private refiners who are to play the major role in shaping the market with their sheer dominance of around 90 percent market shares. Finally we need to examine this refining segment of the industry.

#### **4. Concentration of private refinery**

The refinery layer of the sugar supply chain appears to be characterized by a high degree of concentration. One would thus expect this layer to be potentially more susceptible to collusion. There are 6 private sugar refiners/importers in Bangladesh, all of whom are big conglomerates. Sugar is only one of their many products. The total refining capacity installed of the private refineries is around 4 million tons per year. Of this capacity, 3 million tons is in operation against the total local demand of 1.8 million tons per year. It is obvious from the capacity of the industry that there is no possibility of sudden surge in marginal cost due to its hitting capacity constraint.

However, the capacity of a refinery does not speak for its market share always. Ideally market shares are measured by the quantity of sugar demand met by a refiner. Due to lack of information on quantity demanded, import will be used as proxy for demand since imported sugar correctly represents the bulk amount of sugar marketed in a considerable span of time. Import accounts for more than 90 percent of the domestic demand and firms do not differ very markedly in efficiency. This makes the import share a good approximation of the true market share.

*Table 1: Capacity of the Private Sugar Refiners*

Refinery	Capacity (in ton/day)	Capacity installed
City Sugar Industries Ltd.	3200	5000
United Sugar Mills Ltd.(Meghna)	1800-2000	2000
S. Alam Refined Sugar Industries Ltd.	1800	1800
Abdul Monem Sugar Refinery Ltd.	800	800
Deshbundhu Sugar Mills Ltd.	400-500	500
*Partex Group	300	1000
<b>Total</b>	8,300 - 8,600	11,100

\* This mill closed its business from market at some time in the last 5 years or so.

As presented in Table 2, the market share of sugar of the top-3 groups (C3) are 82 percent of the total sugar import in 2012. Another measure of market concentration is Herfindahl-Hirschman index (HHI). The HHI for the refining segment of the sugar supply chain is 2936. This implies a very large

*Table 2: Market shares of the private sugar refiners*

Refinery	Capacity (in ton/day)	Capacity ins
City Sugar Industries Ltd.	3200	5000
United Sugar Mills Ltd.(Meghna)	1800-2000	2000
S. Alam Refined Sugar Industries Ltd.	1800	1800
Abdul Monem Sugar Refinery Ltd.	800	800
Deshbundhu Sugar Mills Ltd.	400-500	500
*Partex Group	300	1000
<b>Total</b>	8,300 - 8,600	11,100

concentration. The HHI is widely used in the relevant literature as a measure of industry concentration, and it is preferred to concentration ratio above.

This high concentration has given the ground to the persistent claim by some quarters that a cartel of a small number of large importers controls the sugar market. For instance, the CPD study claimed collusive behavior by the small number of importers operating in sugar and other essential commodities market in Bangladesh. However, it must be emphasized that while a small number of players in the market makes it easier to form a cartel, this is not necessarily the inevitable market outcome. Concentration may not necessarily imply market

power in an industry. It may be the consequence of competition or other related factors which lead to a small number of suppliers in an industry.

## **5. Reasons for concentration at the refining layer**

Since private sugar refineries are the main players in the top layer of the sugar supply chain, we need to identify the factors behind their high concentration. This will help us understanding the conduct of the players operating in this layer. Thus, this will also help us assessing competition in this layer of the industry.

### **5.1 Economies of scale and scope**

A distinguishing feature of this industry is that most of these groups are involved also in the import/production and sale of other essential goods such as flour, oil, lentil, onion, mineral water, animal feeds etc. suggesting that there are opportunities for exploiting economies of scope. Economies of scope is said to exist when the average cost of producing any given product is reduced as a firm produces a variety of products rather than specializing in the production or delivery of a single product. Economies of scope arise from effectively sharing production facilities. These conglomerates have access to well-established distribution network for essential products. They use this to economize on distribution costs related to sugar that they manufacture and/or process. Economies of scope in sugar production/processing, together with lower distribution and transportation costs when several essential commodities are sold through a common distribution network, explain why the same set of business groups dominate the markets for several essential commodities through imports/production/processing.

Another important feature of this refining industry is that there exist economies of scale in refining operation. Refining efficiency (refining loss) vary across refineries depending on their plant sizes. Generally it holds that the larger the refinery the greater their efficiency. As a result, there is a tendency toward building bigger size refineries reflecting in a small number of players in the industry.

### **5.2 Natural barriers to entry**

Only a few groups operate in this market because entry requires large sunk cost. Setting up of a standard size sugar refinery requires a huge cost and it does not have a significant alternative use value. Beside the setup cost, a sugar refinery requires a large investment in raw material (i.e., raw sugar) import. Due to the

large sunk cost, it is difficult for new entrants to compete with incumbents who have an advantage of economies of scale. Along with the lumpy fixed cost in setting up a refinery, economies of scope may also discourage new entry into the industry. There are substantial economies of scope in sugar production. For instance, the City Group, one of the largest importers and refiners of sugar in Bangladesh, is also the supplier of 30 other consumer products. This group runs an integrated production facility for all these products, namely oil, salt, flour, soy products, mineral water, and many more in addition to sugar. Substantial product diversification has provided the City group a unique advantage to operate efficiently. Thus, almost all of the existing refining groups are reaping economies of scope in essential commodities production/processing.

For a new entrant to be successful, it is necessary that it uses the economies of scope in production and processing of essentials. Thus, not only fixed costs, economies of scope may also discourage new entry. In order to compete effectively with multi-product firms with economies of scope, new entrants will have to set up a multi-product firm requiring larger investment than what is required for a sugar refinery only.

### **5.3 Strategic barriers to entry**

As described in section 2.3, there is an excess capacity built-up in the refining industry. The presence of excess capacity may act as an entry barrier. Potential entrants may be concerned that, after their entry, the incumbents will flood the market with sugar consequently lowering the sugar price below their cost. Thus, the substantial excess capacity could create a strategic barrier for new entrants ensuring the uncontested market power of the few large refinery groups. However, there is a possibility that the growth of excess capacity was driven by the high effective protection and tax holiday policies of the government, and not by any ulterior motive of blocking new entrants. These policies of providing protection and tax holiday have the undesirable side-effects of encouraging a multiplicity of plants and the growth of excess capacity.

The discussion above only suggests the possibility of anti-competitive practice in the upper echelon of the supply chain. A large amount of advertising expenditure by incumbents may be an entry barrier for new entrants. As a result, if new entrants want to compete with the existing firms, they need more capital for advertisements. The existence of large sunk costs and advertisement costs make their profit margin lower. When the price falls, it may become difficult for them to operate in the market as they will incur large losses.



#### **4. Conclusions**

Refining segment of the sugar industry is highly concentrated with the estimated *Herfindahl-Hirschman* index of 2936. Economies of scale and scope have shaped the market structure of the sugar industry. Almost all of the existing refining groups are exploiting the economies of scope in the production/processing of many essential commodities. For a new entrant to be successful in this market, it is necessary that it utilizes the economies of scope and saves on distributional costs. Thus, not only the fixed costs, but also economies of scope may discourage new entry. To compete effectively with multi-product firms with economies of scope new entrants will require far more investment than is required for a sugar refinery only. There has been no new entry or exit in the refining end of the sugar industry for the last several years.

The existing six refinery groups in this market are far too many relative to the total domestic demand for refined sugar implying the possibility of further concentration in the future. A large amount of advertising expenditure by incumbents may be an entry barrier for new entrants. As a result, if new entrants want to compete with the existing firms, they need more capital for advertisements. The existence of large sunk costs and advertisement costs make their profit margin lower. When the price falls, it may become difficult for them to operate in the market as they will incur large losses.

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## Comparative Profitability of Boro Rice Production Using Alternate Wetting and Drying and Conventional Irrigation in Some Selected Areas of Mymensingh Region

MOUSUMI SAHA\*  
M. SAIDUR RAHMAN\*\*  
KAZAL ASGAR\*\*\*

**Abstract :** *This study looks at the economic profitability of Alternate Wet Drying (AWD) irrigation methods over conventional irrigation practices to address concerns of groundwater depletion associated with Boro rice production. In total 80 farmers of which 40 practice AWD and 40 farmers involved in conventional irrigation were selected randomly from Fulbaria and Trishal upazilas of Mymensingh district and Nakla and Nalitabari upazilas of Sherpur district. Descriptive as well as statistical analyses were done to achieve the objectives of the study. The key finding of the study is that AWD farmers gained more profit than conventional farmers on Boro rice production. The per hectare gross return and gross cost was higher and lower respectively in AWD farmers than conventional farmers from Boro rice production which ultimately leads higher net return of AWD farmers (Tk. 8621.456/hectare) than conventional farmers (Tk. 4551.204/hectare). The undiscounted Benefit Cost Ratio (BCR) was 1.111 and 1.057 respectively for AWD farmers and conventional farmers. The results indicated that application of AWD method was more profitable than conventional practices in Boro rice production. Significant difference was found in irrigation cost*

\* Lecturer, Institute of Agribusiness and Development Studies, Bangladesh Agricultural University, Mymensingh, E-mail: mosumibau70@gmail.com

\*\* Professor, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh

\*\*\* Deputy Manager, Bangladesh Export Processing Zones Authority, (Prime Minister's Office)

*between conventional & AWD well owned farmers whereas there was no significant difference in irrigation cost between water hired conventional & AWD irrigation farmers but significant difference was found in profitability between conventional & AWD farmers. The study finally recommends the AWD method of irrigation should be disseminated every Boro rice producing area through the Department of Agricultural Extension (DAE).*

## **1. Introduction**

The economy of Bangladesh is primary dependent on agriculture, which contributes about 15.33 percent to the Gross Domestic Product (BER, 2016). Within the crop sector, rice dominates with an average 71 percent share of the gross output value of all crops (BBS, 2015). Bangladesh has a population of about 159.9 million with a growth rate of 1.37 percent per annum, giving a population density of 1063 per square kilometer (BER, 2016). The increasing rate of rice production has lessened slightly over the past few years compared to the rate of population increase. To meet the additional needs, the country imports rice every year. In Bangladesh, rice is grown in three distinct seasons: Boro (post-monsoon rice), Aus (pre-monsoon rice), and Aman (monsoon rice). Of the three types of rice, Boro rice alone contributes about 56 percent of total food grains, and is also the highest in productivity (3.965 MT per hectare) compared to Aus rice and Aman rice (BBS, 2015). Thus, the production of dry season irrigated rice has a predominant importance for national food security.

Bangladesh is the fourth largest rice producing country in the world (FAOSTAT, 2012) and third largest (FAPRI, 2009) consumer of rice in the world. About 79 percent of the total cropped area is planted to rice (BBS, 2015). Over 72 percent of the total irrigated area is planted to rice (BBS, 2015). Approximately 60 percent of the country's 1,91,92,164 metric tons rice production is grown during the dry (Boro) season and more than 78 percent of that is irrigated using groundwater resources (BBS, 2015). The environmental downside of Boro season cultivation is that agricultural pumping lowers the water table year on year as monsoonal recharge is insufficient to replenish the aquifers.

Despite the constraints of water scarcity, rice production and productivity have to rise in order to address the increased demand for rice driven largely by population growth and rapid economic development in Asia. Producing more rice with less water is therefore become a formidable challenge for achieving food, economic, social, and water security for the region.

In financial year 2014-15 Mymensingh was the topmost district in Boro rice production and production was 10,80,151 metric tons which is about 6 percent of total Boro rice production (1,91,92,164 metric tons) (BBS, 2015). In greater Mymensingh region, many farmers are devoted them in Boro rice cultivation. But in recent year's farmers face water scarcity problem to irrigate rice field due to aquifer depletion; result of increasing daily extraction rate of groundwater in dry season.

Boro rice in Bangladesh, whether HYV or traditional varieties covering more than 48.43 lakh hectares, shares about 56 percent (BBS, 2015) of the total rice production is entirely irrigated, mostly with underground water. Farmers pay about 25-30 percent of the rice outlet for irrigation (Sattar *et al.*, 2009). For producing 1 kg of paddy, it is estimated that a farmer has to use 3,000-5,000 liters of water for keeping ponded water during the growing stage of plants (BRRI-BRKB, 2017). However, this needs to be reduced to less than 2000 liters of water for one kilogram of rice. In flood irrigation method exposed water surface allows the highest water loss through evaporation. This presents another factor for the economic relevance of water-saving at the farm level. Experts state that on a national level, the implementation of AWD could save costs for irrigation of up to 56.4 million Euros in electricity or 78.8 million Euros in fuel or 30.0 liter diesel/ha (Miah, 2009). This method is very low-cost (the pipe only costs a few taka) and saves irrigation water costs without yield loss which in turn increases the profitability of farmers.

Several literatures were reviewed on application of AWD in producing Boro rice and related studies (Alam *et al.*, 2009; Hasan *et al.*, 2016; Hossain, 2013; Husain *et al.*, 2009; Mishra *et al.*, 1990; Nalley *et al.*, 2015; Price *et al.*, 2013; Rahman and Angelsen, 2011). Most of the literatures focused on the effect of AWD and intermittent irrigation on water use efficiency, yield, irrigation payment systems, sustainability of AWD and probability of using water saving technology but very few of them focused on economic aspects of AWD to the farmers and economic comparison of AWD and conventional irrigation method. These are important issues from the standpoint of agricultural development, since all of it gives pertinent information useful for making sound management decisions, resource allocations, and for formulating agricultural policies and institutional improvement. Hence, the goal of present study are to compare the profitability of Boro rice production between AWD and conventional irrigation using farmers and to identify whether there is significant difference in profitability between two irrigation practices or not.

## 2. Materials and method

The study was conducted in the Mymensingh region which was designated purposively because Boro rice production had expanded tremendously in this district. Trishal and Fulbaria Upazila of Mymensingh district and Nakla and Nalitabari Upazila of Sherpur district were selected purposively. In collecting data at farmers' level, simple random sampling technique is followed. With the help of upazila agricultural officer and SAAO, a total of 80 sampled farmers directly involved in Boro rice cultivation are selected. Among them 40 farmers involved in conventional irrigation and another 40 farmers applied AWD, from whom information has been collected to accomplish this research. The pre-structured questionnaires were used to collect the data during the period from March to May 2016. Data on the costs and returns for one year Boro rice production were collected from AWD and conventional irrigation practicing farmers. The conventional descriptive statistics were employed in analyzing the data. In order to test whether the irrigation cost and profitability of two methods differs significantly or not, non-parametric Mann-Whitney U test was used.

Per acre profitability of Boro rice production from the view point of AWD individual farmers and conventional farmers were measured in terms of gross return, gross margin, net return and benefit cost ratio (undiscounted).

### Gross return (GR)

Gross return was calculated by multiplying the total volume of output of an enterprise by the average price in the harvesting period. The following equation was used to estimate GR.

$$GR_i = \sum_{i=1}^n Q_i P_i \dots\dots\dots(1)$$

Where,

$GR_i$  = Gross return from  $i$ th product (Tk/acre);

$Q_i$  = Quantity of the  $i$ th product (kg/acre);

$P_i$  = Average price of the  $i$ th product (Tk/kg); and  $i = 1, 2, 3 \dots\dots\dots n$ .

### Gross margin (GM)

Gross margin was calculated by the difference between gross return and total variable costs. That is,

$$GM = GR - TVC \dots\dots\dots(2)$$

Where,

GM = Gross margin;

GR = Gross return; and

TVC = Total variable cost

**Net return (NR)**

Net return analysis considered fixed costs; cost of land rent, interest on operating capital etc. Net return was calculated by deducting all costs (variable and fixed) from gross return. To determine the net return of Boro production by using AWD, the following equation was used in the present study:

$$NR = GR - TC \dots\dots\dots(3)$$

Where,

NR= Net return (Tk. /hectare)

GR = Gross return (Tk./hectare); and

TC = Total cost (Tk./hectare)

In this study, cost and return analysis was done on both variable and total basis. The following profit equation was developed to assess the profitability of fish production:

$$\pi = \text{Gross return} - (\text{Variable cost} + \text{Fixed cost}) \dots\dots\dots(4)$$

Here,

$\pi$ = Profit per hectare;

**Benefit-Cost Ratio (BCR)**

The benefit cost ratio (BCR) is a relative measure which is used to compare benefit per unit of cost. BCR was estimated as a ratio of gross return and gross costs. The formula of calculating BCR (undiscounted) is shown as below:

$$\text{Benefit Cost Ratio (BCR)} = \frac{\text{Gross Benefit}}{\text{Gross Cost}} \dots\dots\dots(5)$$

**Mann- Whitney U-test**

To test whether the amount of water used by two methods differs significantly or not the Mann- Whitney U-test were applied. In this test, the scores obtained by

two individual samples are ranked together, giving rank 1 to the lowest score. If ties occur between two or more observations in the same group, the value of U is not affected. But if ties occur between two or more observations involving both groups, the value of U is affected. Although the effect is usually negligible, a correction for ties is available for use with the normal curve approximation employed for larger samples. To those ranks that are tied assign the average of the tied ranks. The ranks received by the two sets of scores are then separately summed up to obtain  $R_1$  and  $R_2$ . To determine the value of U, the following formula was used.

$$\text{Or, equivalently } U_1 = N_1 N_2 - \frac{N_2(N_2+1)}{2} \sum R_1 \dots\dots\dots(6)$$

$$U_1 = N_1 N_2 - U_2 \dots\dots\dots(7)$$

$$U_2 = N_1 N_2 + \frac{N_1(N_1+1)}{2} - \sum R_2 \dots\dots\dots(8)$$

$$U_2 = N_1 N_2 - U_1 \dots\dots\dots(9)$$

Where,

$N_1$  = number of items in the first group (Conventional farmer)

$N_2$  = number of items in the second (larger) group (AWD farmer)

$R_1$  = sum of ranks of first group

$R_2$  = sum of ranks of second group

The smaller of  $U_1$  and  $U_2$  is the Mann-Whitney U. If  $N_2$  is larger than 20, the observed value of U may be transformed to Z value as given by the formula:

$$Z = \frac{U - \left(\frac{N_1 N_2}{2}\right)}{\sqrt{\frac{N_1 N_2 (N_1 + N_2 + 1)}{12}}} \dots\dots\dots(10)$$

The significance of Z may be tested by consulting table of Seigel (1988), i.e. table A of probabilities associated with values as extreme as observed values of z in normal distribution (Seigel, 1988).

### 3. Empirical Results

#### 3.1 Scenario of comparative cost and return

Data on different production input costs and returns from the AWD and



conventionally irrigated plots in study locations are presented in Table 1 and 2. In the study areas variable costs included cost of using human labor, power tiller, seed/seedlings cost, fertilizer, irrigation, pesticides. Considering all locations, it was observed that average labour cost per hectare was estimated at Tk. 21,070.620 (27.76 percent of total gross cost) in case of AWD practice which was lower than the conventional practice as it covers 28.91 percent of gross cost. In the study areas, farmers used power tiller on the basis of rent. Average per hectare power tiller cash cost for tillage operation was higher in AWD practice than the conventional practice and per hectare seed cost was relatively higher for AWD farmer than that of conventional farmer because most of the seed used by the AWD farmer were purchased from the open market at a higher price. Fertilizer requirement for AWD farmer was also higher than the conventional farmer whereas AWD practices required less irrigation cost (Tk. 11,250.700) than conventional practices (Tk. 12,123.650) on per hectare basis in the study areas. Insecticides cost of AWD farmers were also lower than the conventional farmers.

It is observed that the total per hectare variable cost was Tk. 59,060.620 for conventional farmers which covers 74.42 percent of gross cost and on the other hand, it was estimated at Tk. 57,949.710 for AWD farmers which shared 74.97 percent of gross cost. Fixed costs in this study include land use cost and interest on operating capital and depreciation cost. Conventional farmers fixed cost covers 25.58 percent of gross cost whereas for AWD farmers it shared 25.03 percent of gross cost. Annual per hectare cost of rice production was estimated on the basis of gross cost. It appears from Table 1, that per hectare gross costs of Boro rice production of conventional farmers was estimated at Tk. 75,144.890 in Fulbaria Tk. 92,663.280 in Trishal, Tk. 83,638.520 and Tk. 65,226.790 in Nalitabari and Nakla respectively. Considering all the conventional sample farmers of all areas gross cost was estimated Tk. 79,363.150. In case of AWD farmers per hectare gross cost was Tk. 61,187.910 in Fulbaria, Tk. 87,720.940 in Trishal, Tk. 88,295.490 and Tk. 71,419.190 in Nalitabari and Nakla respectively (Table 2). Considering all the AWD sample farmers gross cost was estimated Tk. 77,302.980 which is lower than that of conventional practices in the study areas because of less human labor cost, irrigation cost and insecticides cost in AWD practice.

Per hectare gross return in Fulbaria, Trishal, Nalitabari and Nakla was Tk. 84,655.130, Tk. 93,492.240, Tk. 89,016.590 and Tk. 69,821.620 respectively from Boro rice production of conventional farmers. Per hectare gross returns from Boro rice production of AWD farmers was estimated at Tk. 76,212.170 in Fulbaria, Tk. 91,395.700 in Trishal, Tk. 97,544.710 and Tk. 77,714.140 in

Nalitabari and Nakla respectively. Considering all the sampled AWD farmers per hectare gross return was estimated at Tk. 85,924.440 which is higher than conventional farmers which gross return per hectare was at Tk. 83,914.350 (Table 1 and 2).

Considering all location conventional farmers per hectare gross margin was estimated at Tk. 24,853.740 for Boro rice production and Tk. 27,974.730 was for AWD farmers. So, it was impressive from the results that the gross margin of AWD farmers was greater than that of conventional farmers. Per hectare net return from AWD farmer was higher than that of conventional farmer in every upazila and considering all AWD sampled farmers it was estimated at Tk. 8,621.456 which is higher than that of conventional farmers (Tk. 4,551.204/hectare). So per hectare profitability was higher in AWD practice than conventional practice.

BCR (undiscounted) of AWD and conventional practice was emerged as 1.111 and 1.057, respectively implying that Tk. 1.111 and Tk. 1.057 would be earned by investing every Tk. 1.00 in AWD and conventional practice for Boro rice production. So, it was observed BCR 1.111 of AWD practice for Boro rice production was higher compared to that of conventional practice. Overall it can be concluded that AWD practice for Boro rice production would be more profitable than conventional irrigation practice.

Figure 1: Cost and return of Boro rice production by applying two irrigation practices

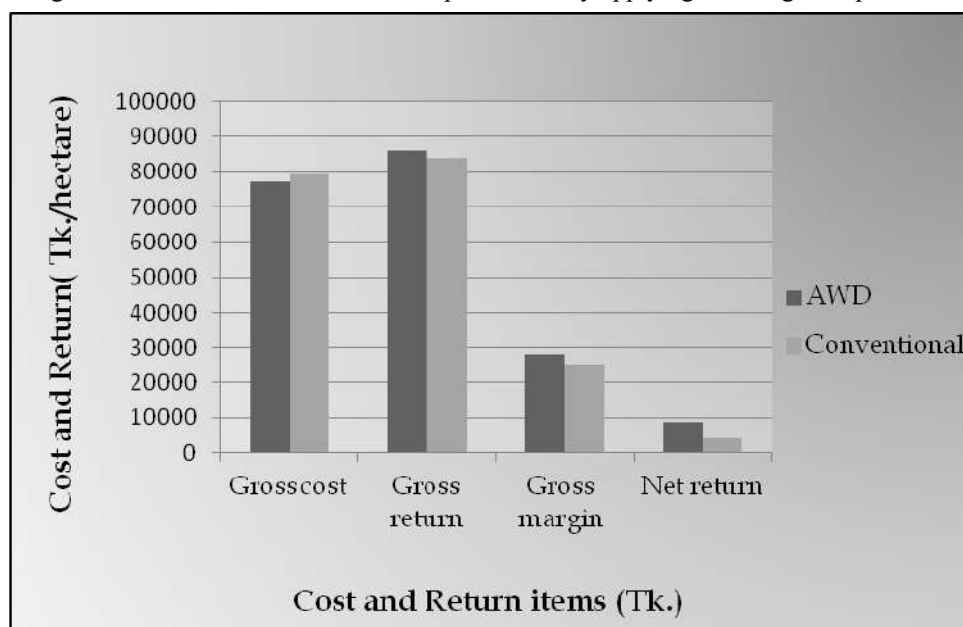


Table 1: Per hectare cost-return and profitability of Boro rice farming with conventional practice

Items	Fulbaria	Trishal	Nalitabari	Nakla	Average	Percentage
<b>Variable cost</b>						
Labour	21501.670	32521.670	20061	17938.330	22946.960	28.91
Power tiller	5493.386	11680.740	6285.949	4785.031	7155.981	9.02
Seed/Seedlings	3196.856	3449.767	3124.107	2668.919	3087.130	3.89
Fertilizer	12239.220	14888.340	11422.710	11350.040	12438.780	15.67
Irrigation	16895.810	11856	14131.940	7970.153	12123.650	15.27
Insecticide	577.980	2030.889	1333.049	997.767	1308.119	1.66
<b>A. Total variable cost</b>	59904.922	76427.406	56358.750	45710.240	59060.620	74.42
<b>Fixed cost</b>						
Land use cost	10087.100	10337.160	22131.200	15234.090	15209.500	19.16
Interest on operating capital	4492.869	5732.055	4226.906	3428.268	4429.546	5.58
Depreciation (Tk./yr)	660	166.667	921.667	854.20	663.490	0.84
<b>B. Total fixed cost</b>	15239.970	16235.880	27279.770	19516.560	20302.530	25.58
<b>C. Total cost (A+B)</b>	75144.890	92663.280	83638.520	65226.790	79363.150	100
<b>Return from Boro rice production</b>						
<b>Main product (Maund)</b>	136.547	153.689	154.804	113.157	139.575	
<b>Price (Tk./Maund)</b>	602	582.2222	558	592	580.882	
<b>Return (Tk.)</b>	83028.730	89348.130	86343.300	67003.210	80963	
<b>By product (Tk.)</b>	1626.400	4144.111	2673.294	2818.415	2951.355	
<b>D. Gross return</b>	84655.130	93492.240	89016.590	69821.620	83914.350	
<b>E. Gross margin (D-A)</b>	24750.210	17064.850	32657.840	24111.390	24853.740	
<b>F. Net return (D-C)</b>	9510.246	828.966	5378.070	4594.832	4551.204	
<b>BCR</b>	1.127	1.009	1.064	1.070	1.057	

Source: Authors' estimation based on field survey, 2016.

Table 2: Per hectare cost-return and profitability of Boro rice farming with AWD practice

Items	Fulbaria	Trishal	Nalitabar i	Nakla	Average	Percenta ge
<b>Variable cost</b>						
Labour	13390.250	30147.780	21305.760	19257.39 0	21070.620	27.76
Power tiller	5603.309	11168.180	6162.954	6398.592	7357.225	9.52
Seed/Seedlings	3013.400	3795.250	4823.324	2015.819	3447.746	4.46
Fertilizer	9437.313	15997.290	13341.130	14761.290	13348.950	17.27
Irrigation	15971.150	9704.250	12547.500	6283.154	11250.700	14.55
Insecticide	465.975	1199.850	1407.641	1318.829	1092.414	1.41
<b>A. Total variable cost</b>	47881.390	72012.590	59588.300	51690.630	57949.710	74.97
<b>Fixed cost</b>						
Land use cost	9085.416	9927.405	23761	14921.210	14411.100	18.64
Interest on operating capital	3591.104	5400.945	4469.123	3876.797	4346.228	5.62
Depreciation (Tk./yr)	630	380	476.666	930.556	595.940	0.77
<b>B. Total fixed cost</b>	13306.520	15708.350	28707.190	19728.560	19353.270	25.03
<b>C. Total cost (A+B)</b>	61187.910	87720.940	88295.490	71419.190	77302.980	100
Return from Boro rice production						
<b>Main product (Maund)</b>	127.256	158.849	175.708	125.922	147.472	
<b>Price (Tk./Maund)</b>	585	549	537	592.777	565.256	
<b>Return (Tk.)</b>	74529.400	86880.350	94790.470	74739.210	82939.880	
<b>By product (Tk.)</b>	1682.767	4515.350	2764.236	2974.924	2984.560	
<b>D. Gross return</b>	76212.170	91395.700	97554.710	77714.140	85924.440	
<b>E. Gross margin (D-A)</b>	28330.770	19383.110	37966.410	26023.510	27974.730	
<b>F. Net return (D-C)</b>	15024.250	3674.757	9259.218	6294.944	8621.456	
<b>BCR</b>	1.246	1.042	1.105	1.088	1.111	

Source: Authors' estimation based on field survey, 2016.

From Figure 1, it was evident that per hectare gross cost for producing Boro rice is higher for conventional farmers than AWD farmers which lead higher gross return, net return and gross margin for AWD practicing farmers than conventional irrigation practicing farmers.

### 3.2 Significant difference test of irrigation cost

By using Mann-Whitney U test as alternative of t-test to test whether the irrigation cost of two methods differs significantly or not from Table 3, it was found that the Mann-Whitney U test statistic is 240.500 and 31.500 for well owned and irrigation water hired farmers' respectively and there is significant difference in irrigation cost between conventional and AWD well owned farmers. But in case of irrigation water hired farmers there is insignificant difference in irrigation cost between two methods because here farmers bought water at fixed rate per acre on contractual basis for one season. As they paid a fixed amount of taka for irrigation water without taking consideration of water amount so they did not pay so much concern for water saving. So in the study areas water saving technology was not efficiently utilized by irrigation water hired farmers. Overall Mann-Whitney u test statistic was 566.500 and it is insignificant so overall there is no significant difference in irrigation cost between conventional and AWD farmers as most of the farmers in the study areas were irrigation water hired farmers.

Table 3: Results of Mann-Whitney U test of irrigation cost difference

Source of irrigation	Hypothesis	Mann-Whitney U test		Comment
		Statistic	p value	
Owner	There is no significant difference in irrigation cost between conventional and AWD well owned farmers.	240.500	0.032**	Rejected
Hired	There is no significant difference in irrigation cost between water hired conventional and AWD irrigation farmers.	31.500	0.302	Accepted
Overall	There is no significant difference in irrigation cost between conventional and AWD farmers.	566.500	0.285	Accepted

Source: Authors' estimation, 2016.

Note: \*\*Significant at 5 percent level.

### 3.3 Significant difference test of profitability

To test whether the profitability of two methods differs significantly or not, by using non parametric Mann-Whitney U test it was found that the Mann-Whitney U test statistic is 508 (Table 4) and it is significant at 10% level of significance which indicates there is significant difference in profitability between conventional and AWD farmers.

Table 4: Results of Mann-Whitney U test of profitability difference

Hypothesis	Mann-Whitney U test		Comment
	Statistic	p value	
There is no significant difference in profitability between conventional and AWD farmers.	508	0.087*	Rejected

*Source:* Authors' estimation, 2016.

Note: \* Significant at 10 percent level.

### Conclusions and recommendations

In the study areas Boro rice production was more profitable under AWD practice than conventional irrigation practice as the per hectare irrigation cost of AWD farmer (Tk. 11,250.700) was lower than the conventional farmer (Tk. 12,123.650/hectare). The use of AWD method would render an eventual profit of Tk. 4070.252 per hectare instead of using the conventional irrigation. BCR was also higher for AWD farmers than conventional farmers. It was evident from the Mann-Whitney U test that there is significant difference in irrigation cost between well owned conventional and AWD farmers' and significant profitability difference was found between conventional and AWD farmers. As application of AWD is profitable and has environmental and climatic benefits, thus there is an ample scope to decrease production cost by reducing irrigation cost in major Boro rice producing areas by practicing AWD method of irrigation. The study finally recommends the AWD method of irrigation should be disseminated every Boro rice producing area through the Department of Agricultural Extension (DAE). The authorities who know the benefits of AWD well in terms of profit, water saving and environmental benefit should play proper role to take it in the policy level. Only then this AWD method of irrigation will get institutional recognition and the ultimate users, farmers of this country will enjoy its benefit directly and that will protect our environment in long run.

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**Appendix Table 1**

Test Statistics of irrigation cost difference between conventional and AWD well owned farmers

	Irrigation
Mann-Whitney U	240.500
Wilcoxon W	646.500
Z	-2.149
Asymp. Sig. (2-tailed)	0.032

**Appendix Table 2**

Test Statistics of irrigation cost difference between conventional and AWD irrigation water hired farmers

	irrigation
Mann-Whitney U	31.500
Wilcoxon W	67.500
Z	-1.033
Asymp. Sig. (2-tailed)	.302
Exact Sig. [2*(1-tailed Sig.)]	0.310 <sup>b</sup>

**Appendix Table 3**

Test Statistics of irrigation cost difference between conventional and AWD farmers

	Irrigation
Mann-Whitney U	566.500
Wilcoxon W	1346.500
Z	-1.070
Asymp. Sig. (2-tailed)	0.285

**Appendix Table 4**

Test Statistics of profitability difference between Conventional and AWD farmers

	Method
Mann-Whitney U	508.000
Wilcoxon W	1103.000
Z	-1.714



## Changes in Input Cost Structure of Boro Rice Production in Bangladesh Over Time

ANZUMAN FERDOUS\*  
HASNEEN JAHAN\*\*

**Abstract:** *The present study was undertaken with a view to examine the changes in the share of different inputs in production cost of HYV Boro rice over time. For computing the changes of share of different cost components in total cost, three sub-periods were considered: Period I (1979-1990), Period II (1991-2003) and Period III (2004-2013). From the results, it was observed that the share of labour cost in total cost has increased significantly over time while share of animal labour/power tiller cost has decreased over time. Share of seed cost and pesticides cost were not significant as compared to the other cost items. Human labour cost occupied the major portion of total cost followed by power tiller and irrigation cost. In period I (1979-1990), human labour cost occupied 21 percent while animal labour/power tiller cost and irrigation cost occupied 16 percent and 9 percent of total cost, respectively. In period II (1991-2003), human labor cost occupied 27 percent while animal labour/power tiller and irrigation cost occupied 14 percent and 18 percent, respectively. In period III (2004-2013), share of human labour and animal labour/power tiller cost were 39 percent and 7 percent, respectively whereas share of irrigation and fertilizer costs were 15 percent and 11 percent, respectively. The analysis showed that there have been significant changes of different cost items as well as total cost over time which have greater impact on the production of Boro rice in Bangladesh.*

**Key words:** *Inputs, Production Cost, Boro Rice, Time*

\* Ex Ms student, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.

\*\* Professor, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh

## **1. Introduction**

In spite of major contribution of rice to agricultural economy, any traditional rice producers are incapable of producing at the frontier level to contribute to food security and satisfy household consumption in Bangladesh. Boro is the most important and single largest crop in Bangladesh in respect of volume of production. It has been persistently contributing to higher rice production in last successive years. Total area under Boro crop has been estimated 47,90,305 hectares in Fiscal Year 2013-2014 as compared to 47,60,055 hectares of the previous year (2012-2013). The harvested area for Boro crop has increased by 0.64 percent for the year 2013-2014. The average yield rate of Boro rice in FY 2012-13 was estimated at 3.945 metric tons per hectare which was 1.16 percent higher than that of previous year. Total Boro production in FY 2012-13 was estimated at 1,87,78,154 metric tonnes. The production was estimated at 1,90,07,206 metric tonnes in the following year (2013-14) (Bangladesh Bureau of Statistics, 2014). The rate of growth of rice production in the country is lower than the rate of growth of demand for rice in the country. To meet additional demand, the country has to import rice almost every year in the previous decades (Nargis and Lee, 2013).

Now a days the cost of production of cultivating paddy is very high than that of before. In an effort to maintain productivity growth, the Bangladesh Rice Research Institute (BRRI) has developed over 30 HYVs for different seasons and agro-ecological zones. The rapid growth of minor irrigation equipment has inspired the farmers to make a progressive shift from high-risk, monsoon dependent agriculture to low-risk, irrigation-based agriculture. Over the last three decades, the technology of the 'green revolution'— of High Yielding Variety seeds, irrigation, fertilizer and pesticide have enhanced rice production by mainly enhancing irrigated areas and yields. Farmers' acceptability of hybrid rice technology in the country is found very much encouraging with few exceptions. In this perspective, The fluctuation of the cost of different inputs has a great economic impact in terms of rice production, lead to an uncertainty in the income of the producers. The uncertainty retards investment in agriculture resulting in slow growth of agricultural output. Therefore, it is an urgent to examine the changes of cost structure of Boro rice production over time. Therefore, the present study aimed to examine the changes in cost structure of Boro rice production over time.

## **2. Materials and Methods**

The present study is based on secondary data of different cost components of HYV Boro rice over a period of 1979-1990, 1991-2003 and 2004-2013 in whole

Bangladesh. Time series data has been used in the analysis. A time series is a collection of observations of well-defined data items obtained through repeated measurements over time. To attain the objectives of the study, time series data for major cost items such as human labour, animal labour/power tiller, seed, fertilizers, irrigation and pesticides costs of Boro rice production in Bangladesh were collected for the period of 1979 to 2013. For computing the share of different cost components in total cost, the whole time period mentioned above was divided into three sub-periods in order to understand the changing pattern of cost components of HYV Boro in different time periods. The sub-periods that were considered for this purpose are:

- a) Period-I: 1979-1990.
- b) Period-II: 1991-2003.
- c) Period-III: 2004-2013.

The required data for the present study were collected from different secondary sources. The data for different cost components of HYV Boro production in Bangladesh were collected mainly from the Handbook of Food Planning and Monitoring Unit (FPMU), Ministry of Food, Government of the People's Republic of Bangladesh. This data set was supplemented by the data collected from the Year Book of Agricultural Statistics of Bangladesh for different years. Percentage share of each cost components in total cost was calculated to see the share changes of different inputs for three different periods.

### **3. Results and Discussion**

Human labour is the most important factor (input) in the production process of HYV Boro rice. When individual inputs were concerned it was observed that expenses on human labour shared a major portion of expenses in the production of HYV Boro rice. Both family and hired labour are used in production of HYV Boro. Family labour includes the farmer and his family members while the hired labour includes permanent hired labour, labour employed on contract basis and casual labour. Table 1 presents the structures of total cost and human labour cost in different time periods as well as change in percentage share of human labour cost in total cost over time. The comparisons of costs and change in factor share have been made based on three time periods: 1979-1990 (Period I), 1991-2003 (Period II) and 2004-2013 (Period III). All the cost items discussed in this section were estimated at nominal price.

*Table 1: Per hectare change in share of human labour cost in total cost over time*

Year	Total cost	Human labour cost	(Cost in Taka)
			Share in total cost
1979-1990	22,990	4,818	21%
1991-2003	32,904	8,919	27%
2004-2013	83,421	32,384	39%

It can be seen from Table 1 that the share of human labour cost in total cost was 21 percent in period I. The respective share was increased to 27 percent in period II. The share was further increased to 39 percent in period III, which is much larger compared to period I and II. Therefore, it can be said that share of human labour cost in total cost has substantially increased in the last decade for Boro rice production.

Animal labour or power tiller is mostly used for land preparation. These are also used for land leveling and in some cases for threshing and carrying of paddy as well as other inputs and outputs of paddy production. In recent years the use of animal power is greatly replaced by the power tiller because of the scarcity of draft animal power. The main advantage of using power tiller in land preparation is that a power tiller can in principle work 24 hours a day at the same level of efficiency. Table 2 presents the structures of total cost and animal power/power tiller cost in different time periods as well as change in percentage share of animal power/power tiller cost in total cost over time.

*Table 2: Per hectare change in share of animal labour/power tiller cost in total cost over time.*

Year	Total cost	Animal labour/power tiller cost	(Cost in Taka)
			% of Total cost
1979-1990	22,990	3,749	16%
1991-2003	32,904	4,741	14%
2004-2013	83,421	6,191	7%

From Table 2, it can be seen that the share of animal labour/power tiller cost in total cost was 16 percent in period I. The respective share was decreased to 14 percent in period II. The share was further decreased to 7 percent in period III, which is about half compared to period I and II. Therefore, it can be said that share

of animal labour/power tiller cost in total cost has decreased in the last decade for Boro rice production mainly because of replacement of animal power by power tiller.

Seed is the most basic and crucial input for Boro rice production. Supply of quality seed is very important to ensure rice production. Hossain (2002) have shown that Bangladesh can increase its rice production to the tune of 20 lakh tones alone by ensuring supply of quality seeds of the same varieties to the farmers. Several modern rice varieties are available for cultivation in the Boro season. Some of the varieties of Boro rice that farmers grow include BRRI Dhan 28, BRRI Dhan 29, BRRI Dhan 25, BRRI Dhan 36 and BRRI Dhan 47. BRRI Dhan 47 has been developed for cultivation in the salinity affected southern-coastal region. Farmers use both home supplied and purchased seeds for Boro production. The cost for both purchased and home supplied seeds has been estimated on the basis of prevailing market price.

Table 3: Per hectare change in share of seed cost in total cost over time.  
(Cost in Taka)

Year	Total cost	Seed cost	% of Total cost
1979-1990	22,990	965	4%
1991-2003	32,904	2,195	7%
2004-2013	83,421	1,413	2%

From Table 3, it can be seen that seed cost occupies a small percentage share in total cost although it is the most crucial input for any production practices. The percentage share of seed cost in total cost was 4 percent in period I. The respective share was increased to 7 percent in period II. However, the share was decreased to only 2 percent in period III, probably because of rise in other factor shares in total cost.

Fertilizer is one of the most important inputs in producing HYV Boro rice. The expansion of cultivation of HYVs witnessed a tremendous use of chemical fertilizer in the country. Farmers mostly use Urea, Triple Super Phosphate (TSP), Muriate of Potash (MOP) and sometime a few other fertilizers. Table 4 presents the structures of total cost and fertilizer cost in different time periods as well as change in percentage share of fertilizer cost in total cost over time.

Table 4 shows that the share of fertilizer cost in total cost was 6 percent in period I. The respective share was increased to 11 percent in period II. The share remained same to 11 percent in period III although the cost was increased in

Table 4: Per hectare change in share of fertilizer cost in total cost over time.

Year	(Cost in Taka)		
	Total cost	Fertilizer cost	% of Total cost
1979-1990	22,990	3,673	6%
1991-2003	32,904	3,702	11%
2004-2013	83,421	9,652	11%

nominal term. It indicates that the use of fertilizer as well as cost of fertilizers in producing HYV Boro was more or less constant over the years.

Irrigation is the leading input in producing HYV Boro rice. Among all the operating expenses, cost of irrigation occupies major share of total cost for the production of HYV Boro. Irrigation is a major challenge for farmers growing crops in the dry season. Majority of the farmers purchase water from pump owners. Three modes of payment of water charge are currently in place. These are: crop sharing arrangement, fixed charge on per acre basis, and machine rental system where the farmers directly supply diesel. Table 5 presents the structures of total cost and irrigation cost in different time periods as well as change in percentage share of irrigation cost in total cost over time.

Table 5: Per hectare change in share of irrigation cost in total cost over time.

Year	Cost in Taka)		
	Total cost	Irrigation cost	% of Total cost
1979-1990	22,990	2,170	9%
1991-2003	32,904	5,884	18%
2004-2013	83,421	12,487	15%

Table 5 represents that for producing Boro rice, the share of irrigation cost in total cost was 9 percent in period I. The respective share was increased to 18 percent in period II. The share was slightly decreased to 15 percent in period III though the cost was increased almost double between these periods. This indicates that compare to irrigation cost, other costs were increased more rapidly (e.g. labour cost) and captured the major share of total cost.

The pesticides market has a rather different history than fertilizers, with relatively little public sector involvement. In the last few years most of the farmers used pesticides in producing HYV Boro for ensuring high yield. The Ministry of Agriculture did play a role, however and limited the imports to specified brands



and also required dealers to be licensed. Table 6 presents the structures of total cost and pesticides cost in different time periods as well as change in percentage share of pesticides cost in total cost over time.

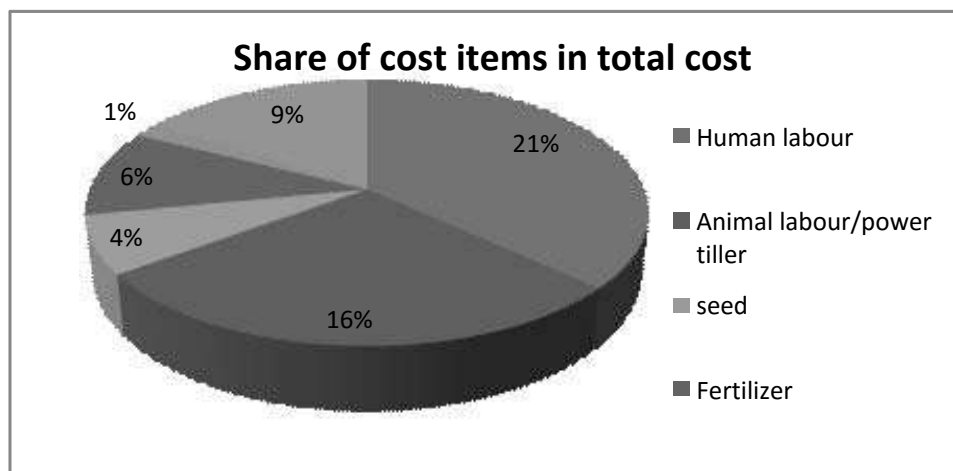
Table 6: Per hectare change in share of pesticide cost in total cost over time.

Year	(Cost in Tk)		
	Total cost	Pesticide cost	% of Total cost
1979-1990	22,990	240	1%
1991-2003	32,904	657	2%
2004-2013	83,421	1,688	2%

From Table 6, it can be seen that the share of pesticide cost in total cost was 1 percent in period I. The respective share was increased to 2 percent in period II. The share was remained same to 2 percent in period III although the cost was increased in nominal term.

Figure 1 presents percentage share of different cost items in three distinct time periods.

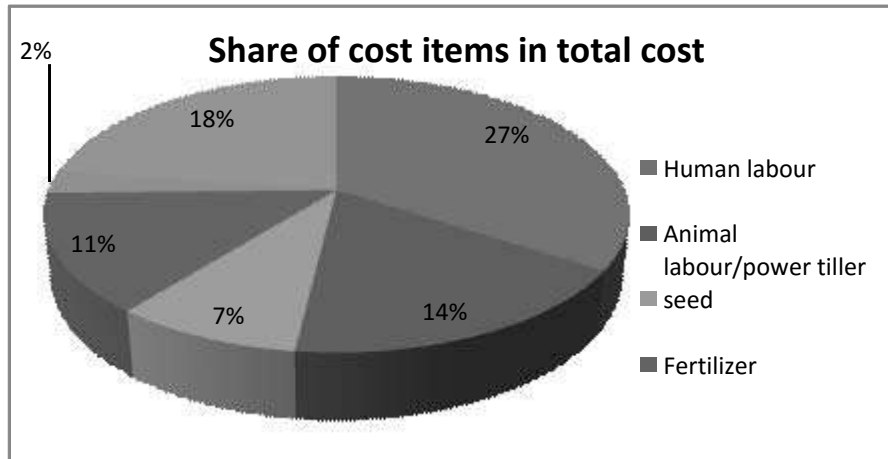
Figure 4.1: Percentage share of different cost items in three distinct time periods



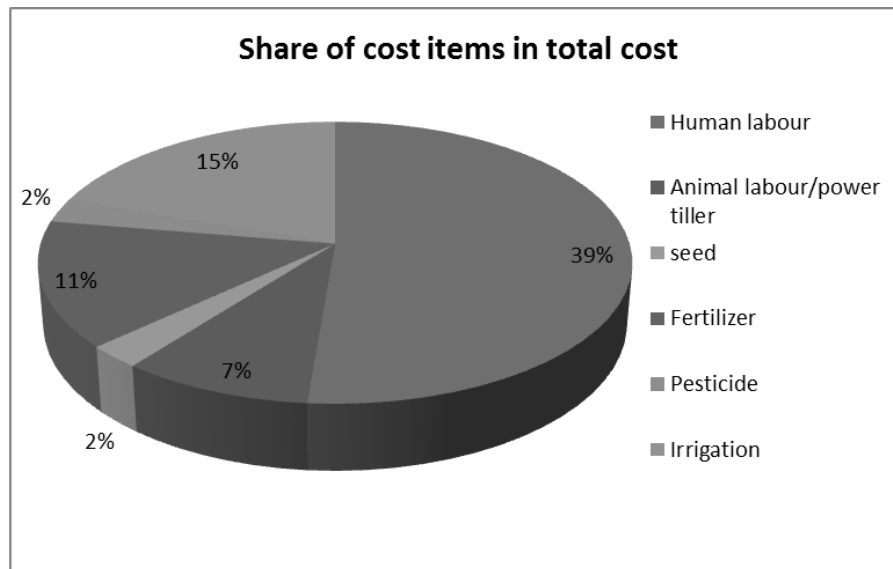
Period I: 1979-1990

#### 4. Conclusion

The analysis showed that there have been significant changes of different cost items as well as total cost over time. There was a significant increase in share of human labour cost in total cost which indicates that the production of Boro rice become more labour intensive. Since, human labour, animal labour/power tiller



Period II: 1990-2003



Period III: 2004-2013

and irrigation cost occupied the major share of total cost, the increased share of these cost items have considerable impact on Boro rice farmers' profitability. On the basis of the results of this study some recommendations are made as follows:

1. Labour cost is the major element in HYV Boro production. High labour cost affects the profitability. So for increasing production, the labour cost can be minimized by using modern technology.

2. Expansion of irrigation facilities can contribute to the adoption or expansion of improved varieties as well as significantly increase the yield of traditional varieties. Diesel and electricity price need to be controlled to minimize the irrigation cost.
3. Government organizations should play an active role to ensure farmers' profitability either by output price support or by input subsidy.

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## Interest Rate Spread in the Banking Sector of Bangladesh

Khan A. Matin\*

**Abstract:** *This paper aims at analyzing interest rate spread (IRS) in banking sector in Bangladesh for the period 2010 to 2015 using panel data on 47 commercial banks. The long-term bidirectional causality among deposit rate, lending rate and spread and their trend have also been investigated. Interest rate in the banking sectors has been persistently high over the years until recently. High interest rate spread has been considered by many as institutional inefficiencies of financial intermediation. The data are from the annual reports and financial statement of individual banks, Bank and Financial Institutions Division's annual reports, and various publications of the Bangladesh Bank and Bangladesh Bureau of Statistics. The present study investigates the effect of the variables on spread by applying Feasible Generalised Least Squares (FGLS) method. The long-term trend of the deposit rate, lending rate and spread-their causal relationship has also been investigated. In the time series annual data for the period 1975-2016 the least squares annual growth rate of deposit was found to be 0.60 per cent, the annual growth rate of lending rate was -0.10 per cent and the rate of change of spread was -0.70 per cent. The Granger causality test showed that there is no bidirectional causality between spread and lending rate, spread and deposit rate, and even between lending and deposit rate. The banking industry concentration-measured by the level and trend of the Herfindahl-Hirschman Index for both deposit and credit for the period 2008-2015 suggested declining trend in concentration in both deposit and credit-at about the same rate- suggesting competitive atmosphere in banking sector in recent years. In the panel regression analysis on 47 banks for the period*

\* Professor (Formerly) at the Institute of Statistical Research and Training (ISRT), University of Dhaka. Email: kmatin@isrt.ac.bd, kmatin\_isrt@yahoo.com

*2010-2016, it appears that non performing loans, concentration of market share of deposits and credits, non interest income, capital ratio and statutory regulatory requirement all had significant effect on the spread. The effects of the determinants of spread was not uniform in models fitted for different bank groups as it is expected.*

**Keywords:** Interest rate spread. Panel regression analysis, Bangladesh

*JEL Classification. C23 G21, G30, O6*

## **Introduction**

The interest rate spread has been considered as an important determinant of the efficiency of the financial system. The IRS is expected to decline over time with the development of the financial sector. The large IRS spread works as an impediment to the expansion and development of the financial intermediation. Like in many developing countries IRS has been perceived to be high in Bangladesh. It has often been argued that the higher the IRS, the higher would be the cost of credit to the borrowers for any given deposit rate. Alternatively, a high IRS could mean unusually low deposit rates discouraging savings and limiting resources available to finance bank credit. In a country like Bangladesh, a high IRS raises the cost of credit restricting the access of potential borrowers to credit markets thus reducing investments and limiting growth potential of the economy. IRS has been considered as a measure of bank efficiency and determinant of intermediation cost and profitability of the banks. In Bangladesh studies concerning the analysis of IRS, its movements and determinants have been very recent and few. Due to various measures taken by the Bangladesh Bank, the IRS has shown declining trend in recent years and for 2016 it was 4.85 per cent.

## **Review of Literature on Bangladesh**

Ahmed and Islam (2006) while making an analysis on the IRS observed that in Bangladesh spread in the banking sector has been persistently high over the years. The inefficiency originated from the government's 'interventionist policies' of the past and inadequate technical skills in the arena of risk and portfolio management, which caused the high spread in the banking system. If this situation continues indefinitely, private sector investment may be jeopardized. Therefore, lowering of the high banking spread would require substantial improvement in the current situation of limited competition, overstaffing, high administrative costs, the burden of NPLs, and above all, congruence between monetary and fiscal policy stances.

Mujeri and Younus (2009) using panel data of 48 scheduled banks for the period 2004-08 found that the higher the non-interest income as a ratio of total assets of a bank, the lower its spread. Similarly, market share of deposits of a bank, statutory reserve requirements, and NSD certificate interest rates affect the IRS. The analysis in terms of bank groups shows that IRS is significantly influenced by operating costs and classified loans for state owned commercial banks (SCBs) and specialised banks (SBs); while inflation, operating costs, market share of deposits, statutory reserve requirements, and taxes are important for the private commercial banks (PCBs). On the other hand, non-interest income, inflation, market share, and taxes matter for the foreign commercial banks (FCBs).

Suzuki and Adhikary(2009) found a varied level of high nominal lending rates, high nominal spreads and too low or negative real spreads as per different clusters of banks both in the pre-liberalized and liberalized regime, and concludes that this persistent varied performance is largely the outcome of a high amount of non-performing loans, inefficiencies in managing credit risks, and fragmentation and distorted competition in the banking system. This varied level of performance of the banking clusters also results from the government's intervention in the activities of nationalized commercial banks and specialized banks for mediating credits to priority sectors at a subsidized rate. The study suggested that a more coordinated use of monetary and fiscal policies is required with a view to creating appropriate rents for banks for redressing their current dismal performance.

Hossain (2012) analysed interest rate spreads and margins in banking in Bangladesh by applying the Arellano-Bover/Blundell-Bond dynamic panel regression model to a panel of 43 banks for the period 1990-2008. It revealed persistency in interest spreads and margins. The model also identified that high administrative costs, high non-performing loan ratio and some macroeconomic factors are the key determinants of persistently high interest rate spreads and margins. These factors together imply a lack of competition and efficiency in the banking sector of Bangladesh despite financial reforms. In addition, aggregate time-series data analysis reveals the fact that spread is sensitive to deposit rates, not the lending rate, meaning that any shock to spread eventually transmits to the deposit rate. This finding suggests that recently imposed control on the lending rate may not help reduce the level of spread in the medium-to-long run as envisaged by the Bangladesh Bank. This implies that any shock to spread is supposed to translate to deposit rate in the long run. Thus, the factors that appear to propel high spreads and margins are distortions in the loans market, institutional impediments and the policy environment. All these factors together

imply that banking sector in Bangladesh is not efficient and competitive despite a certain degree of financial reforms.

Nguyen, Islam and Ali (2010) found Asymmetric adjustments in the Bangladeshi lending-deposit rate spread. The deposit rates adjust faster when the spread is widening than when it is narrowing. These findings seem to support the customer reaction hypothesis as articulated by Stiglitz and Weiss (1981). A plausible interpretation of the asymmetries is that they are likely due to the efforts to maximize the personal gains of bank management. Strong political will would be needed to establish a more competitive and efficient banking sector that would be conducive for economic progress in Bangladesh

Afroze (2013) analyzing time series data for the period 1974-2011 found statistically significant correlation between IRS and deposit rate but no correlation with the lending rate. The data series for IRS, deposit rate, and lending rate contained a unit root and were integrated of order one. However, the Granger causality test failed to indicate any bilateral causal relationship between IRS and deposit rate, IRS and lending rate, and also to deposit rate and lending rate. The study also found that IRS prevailing in the Bangladeshi banking sector was high compared to that in its neighboring countries.

Studies conducted have attributed the existence of high spread in developing countries to several factors, such as high operating costs, financial repression, lack of competition and market power of a few large dominant banks enabling them to manipulate industry variables including lending and deposit rates, high inflation rates, high risk premiums in formal credit markets due to widely prevailing perception relating to high risk for most borrowers, and similar other factors (Agu 1992, Aryeetey, Hettige, Nissanke and Steel 1997, Barajas et al. 1999, Brock and Rojas-Suarez 2000, Smirlock 1985, Chirwa and Machila, 2004 Beck and Hesse, 2009, Khan and Khan, 2010, Khawza and Din, 2007). A substantial body of theoretical and empirical literature has explored various determinants of interest spread including: (i) market structure of the industry; (ii) bank specific factors; (iii) macroeconomic variables; and (iv) financial regulations.

### **Objective of the Study**

The study aims at analyzing the movement, trend and determinants of the interest Rate Spread (IRS) of the commercial banks in Bangladesh. The banking system structure, industry concentration, behaviour of deposit and lending rates shall also be studied.



### Data and Methodology

Data of all bank specific variables were obtained from the Websites of the respective banks. The annual data of 47 commercial banks for the sample period 2010 to 2015 have been used to estimate the model involving panel data. The data were compiled from Annual Reports and Financial Statements of individual banks, Annual Reports of Bank and Financial Institution Division (BFID) and publications of Bangladesh bank and Bangladesh Bureau of Statistics. The online data maintained by ADB, OECD, World Bank and IMF have also been used. All ratios are estimated by the author. The panel variable (Banks) was balanced. The Feasible Generalised Least Squares (FGLS) model for panel data has been applied to estimate the effect of the explanatory variables (White, 1980). The estimation of the regression equations has been carried out using the STATA12 package. The list of banks selected for the present study is given in Annex I.

### Model Specification and Variables

In this section, we develop a simple model to analyse the interest rate spread (IRS) in Bangladesh. In the literature, the determinants of IRS have often been modeled within a framework incorporating profit maximising behaviour of the banks.

The regression model is specified as follows:

$$\text{Where } IRS_{it} = \alpha_0 + \beta X_{it} + \varepsilon_{it} \quad i = 1 \dots N \quad (1)$$

$IRS_{it}$  is the interest rate spread of the  $i$ th bank in the period  $t$

$(\alpha_0, \beta)$  is a vector of parameters

$X_{it}$  is a vector of explanatory variables,  $\varepsilon_{it}$  is a stochastic error term

### Banking Sector in Bangladesh

The formal financial sector of Bangladesh includes all regulated institutions like Banks, Non-Bank Financial Institutions (FIs), Insurance Companies, Capital Market Intermediaries like Brokerage Houses, Merchant Banks etc.; Micro Finance Institutions (MFIs). It thus consists of money market (comprising operations of the banking system, microcredit institutions, nonbank financial institutions, interbank foreign exchange market), the capital market (stock markets), bond market and the insurance market. The formal financial sector in Bangladesh mostly consists of banks. According to a recent estimate (Mansur, 2015) banking sector assets accounted for 63 per cent of the total assets of the

The description of the variables is given in table 1.

*Table 1: Description of the variables used in the regression models.*

Variable	Description	Hypothesised Relationship
Dependent		
IRS	Difference between WALR and WADR	
Independent		
Bank specific characteristics		
NPLTL	Ratio of non-performing loans to total loans	+
OC_ASSET	Non-interest expenses over total assets	+
WADR	Weighted average deposit rate	+/-
NONII_ASSET	Non-interest income over total assets	+
NONII_ININC	Non interest income to interest income	-
MSD	Market share of deposit	+/-
BANK LIQUIDITY	Total advances to total deposits	-
CAPITAL RATIO	Total book value of shareholders equity over total assets	+
SIZE	Log natural of Total assets	+
Bank industry specific characteristics		
NSD3YR	National Saving Deposits 3yr Interest rate	+/-
SRR	Statutory Regulatory Requirments	+/-
HHI_CR	HHI for loans and advances	+/-
Macroeconomic variables		
GDP	annual gdp growth rate	+/-
INFL	annual CPI inflation rate	+/-

formal financial sector in 2013. Mujeri and Younus (2009) observed that banking sector accounts for around 96 per cent of the assets of the financial sector. WB (2006) recorded the banking assets as percentage of total financial assets as 87 per cent for the year 2004 in Bangladesh. However along with the development of the capital market the share of the assets of the banking sector shall have to be compromised. There is paucity of data in this aspect. The ratio of banking sector assets to GDP in 2016 was 71.13 per cent.

After independence in 1971, all commercial banks (except the foreign owned banks) were nationalised and the government-imposed controls over deposit rates in order to keep the lending rates low. Afterwards, six private commercial banks were allowed to operate in 1983 and the number of private banks has now risen to 39. For most of the period after independence, Bangladesh inherited a repressed financial system in which the banks and other financial institutions were used as cheap sources of credit for export processing and import substituting industrialisation. During the period, measures like control over interest rates, selective credit allocations, rules and regulations suppressing the development of

money and capital markets, and maintenance of overvalued domestic currency contributed to financial repression, inefficiencies in investment, and non-repayment of loans by the borrowers (Rahman 2007).

### **Interest Rate Reform**

Bangladesh began to implement financial sector reform measures in the 1980s and the interest rates were partially deregulated in November 1989. Prior to the initiation of reforms in the 1980s, Bangladesh's financial system constituted typical examples of what economists dubbed 'financial repression'. Competition between banking institutions remained stifled and banks had little incentive to develop their activities. As a result, the institutional capacity of banks to manage the systemic and idiosyncratic risks in financial systems has failed to develop sufficiently. Under the financial sector reform programs, a new system of interest rate determination was established with deposit & lending rates that better reflects market conditions. The main objective of the new interest rate policy is to introduce flexibility into the deposit rates permitting individual banks to establish their own rates fixed by themselves. Banks are now free to adjust their own rates effective from February 19, 1997. Furthermore, flexibility in the interest rate policy introduced from July 12, 1999 permits banks to differentiate interest rates among individual borrowers except for lending to exporters only. For other sectors, lending rates would be decided by the banks themselves. Apart from the conventional deposit and lending rates, the Islamic banks in Bangladesh have been carrying on their banking transactions in line with the Islamic Shariah systems of interest-free policy. Under this policy, investment-income of the bank is shared with the mudaraba depositors according to a pre-agreed profit-sharing ratio to ensure a reasonably fair rate of return on their deposits (Mujeri and Younus 2009, Hossain, 2010, Rahman, 2012, (BB, 2017).

### **Banking System Structure**

As on June 2016, there are 56 commercial banks operating in Bangladesh comprising six state owned commercial banks (SCBs), two state owned specialized banks (SBs), 39 private commercial banks (PCBs), and nine foreign commercial banks (FCBs). Table 2. As of June, 2016, the 39 PCBs are in the ownership of 63.0 per cent of industry assets and 64.1 per cent of industry deposits. The six SCBs are in the ownership of 28.4 per cent of industry assets and deposit. The 2state owned specialized institutions (SBs) also known as Development Financial Institutions are in possession of 2.9 per cent of assets and

3.1 per cent of assets and deposits. The 9 FCBS had the ownership of 5.4 per cent of industry assets and 4.4 per cent of industry deposits. It may be mentioned here that 9 PCBs and 1 FCB run their business on the basis of Islamic Shariah. The list of banks is given in Annex I.

Table 2: Banking System Structure (As on June, 2016)

Bank Type	Number	Number of branches	Total Assests (billion Tk)	% of industry assets	Deposits (billion Tk)	% of deposits
State owned Commercial banks(SCBs)	6	3770	3219.1	26.1	2447.4	29.0
Development Financial Institutions(D FIs)	2	1407	302.2	2.5	247.4	2.9
Specialized Banks (SBs)						
Private Commercial banks (PCBs)	39	4271	8254.6	67.0	5382.3	63.8
Foreign Commercial banks (FCBs)	9	75	550.6	4.5	358.9	4.3
Total	56	9453	12326.4	100.0	8436.0	100.0

Source: Bangladesh Bank. Annual Report 2015-16.

### **Movements in WADR WALR and IRS: 1975-2016: Long Term**

rate regime of the preceding period under which the level as well as the structure of interest rates were controlled in order to limit the cost of financial intermediation and ensure a reasonable structure of lending and deposit rates. Since the implementation of reforms, interest rates in Bangladesh's financial sector have largely been freed relative to the administered interest. The movements in lending and deposit interest rates in nominal since the 1975 are shown in Figure 1. In general, nominal interest rates were fixed at relatively low levels in the 1970s. The nominal deposit rate varied between 3.51 per cent in 1975 and 4.27 per cent in 1979, while the nominal lending rate was 11.28 per cent in 1975 and 11.12 per cent in 1979 and the interest rates maintained a slowly rising trend throughout the 1980s. With liberalisation in the banking sector policies, interest rates started to decline in 1992 which continued till 1996. Afterwards,

another trough in interest rates can be noticed in 2004. The Interest rate spread having a value of 7.77 per cent in 1975 gradually decreased to 5.80 per cent in 1990 followed by an increase to 7.88 per cent in 1993 after which it gradually decreased to 4.86 per cent in 2009. The interest rates started climbing afterwards followed by another trough in 2010 which started to increase again with some fluctuations. For the year 2010, the WADR was 6.01 per cent, the WALR was 11.31 per cent and the IRS was 5.21 per cent. The interest rates started increasing again and reached another crest in 2014- where the WADR was 8.54 percent, WALR was 13.67 per cent and the IRS was 5.31 per cent. For the last 3 years the interest rates are showing slow down and in the year 2016 the value of WADR was 5.54 per cent, WALR decreased to 10.39 per cent, thus having a IRS of 4.85 percent. With little fluctuations the value of IRS was found to be 4.85 for the year 2016.

For the total period under consideration the average value of WADR, WALR and IRS per year was found to be 6.75 per cent, 12.95 per cent and 6.20 per cent respectively. The least squares trend line fitted to the data gives indication of slight downward symptoms in the WALR. The fitted trend line for the WADR on the other hand shows some upward directions. The fitted line for the IRS suggests decline in its value in years to come. The factor time had significant positive effect on WADR and it had significant negative effect on IRS. It did play any significant role in determining the WALR. In the time series annual data for the period 1975-2016 the least squares annual growth rate of deposit was found to be 0.60 per cent, the annual growth rate of lending rate was -0.10 per cent and the rate of change of spread was -0.70 per cent. Table 3 and Figure 1.

Table 3: Least Squares Growth Rate of WADR, WALR and IRS :1975-2016.

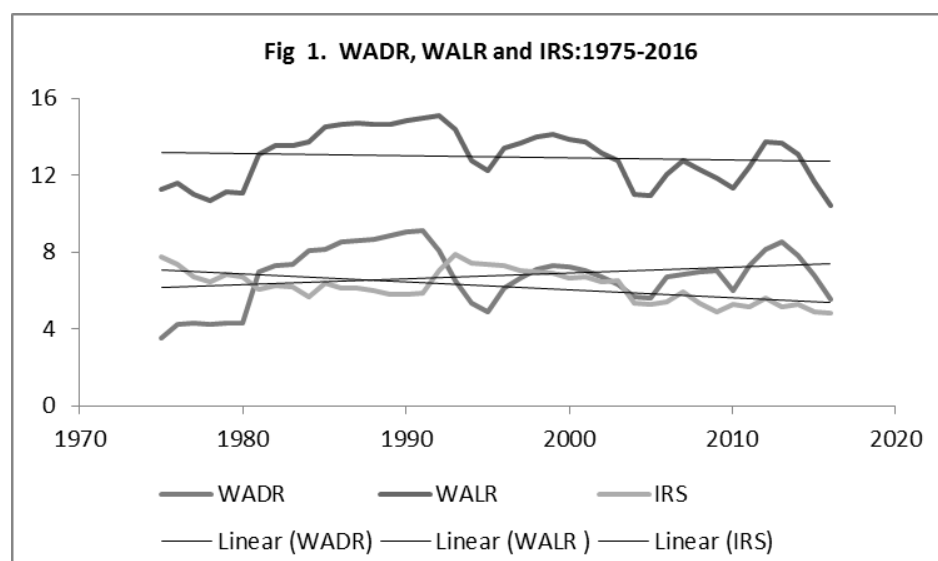
Indicators	N (Mean)	Regression Coefficient ( $\beta^*$ )	t-ratio	P- value	R squares	Least Squares Growth Rate(%)	D-W
WADR	42(6.75)	.006	2.14	.038	.10	0.60	.30
WALR	42(12.95)	-.001	0.52	.606	.01	-0.10	.33
IRS	42(6.20)	-.007	5.07	.000	.39	-0.70	.46

Source and Notes: Bangladesh Bank. Author's Computation

The Regression line is  $\ln X_t = \alpha + \beta T$ . The average annual growth rate  $r = [\exp \beta^* - 1] \times 100$ , where  $\beta^*$  is the least squares estimate of  $\beta$ .

### Granger Causality Test

In order to understand the long-term behavior of the IRS and its components- WADR and WALR, Vector Autoregression Analysis (VAR) and Granger



Causality test have been performed. The Granger causality test refers to the effects of past values of one variable on the current value of another variable. The purpose of performing Granger Causality test is to examine whether the change in spreads is associated with deposit rate or loan rate. The Granger causality model is used to test the causality amongst the variables-WADR, WALR and IRS. The result shows that there is no bilateral directional relationship between IRS and WADR, IRS and WALR, and even WADR AND WALR. Table 4.

*Table 4: Granger Causality Tests, 1975-2016*

Null hypothesis	Obs.	Wald $\chi^2$	Probability	Decision
lnWADR does not Granger Cause lnIRS	40	1.2702	0.5307	Accept the null hypothesis
lnIRS does not Granger Cause lnWADR	40	2.0644	0.356	
lnWALR does not Granger Cause lnIRS	40	1.6785	0.432	Accept the null hypothesis
lnIRS does not Granger Cause lnWALR	40	4.2874	0.117	
lnWALR does not Granger Cause lnWADR	40	3.9586	0.138	Accept the null hypothesis
lnWADR does not Granger Cause lnWALR	40	3.3919	0.183	

Note. Sample 1975-2016, lags 2

**Recent Movement of IRS by Types of Bank**

In June 2010, for the SCBs the value of IRS was 3.64 per cent which showing an increasing behavior to 5.07 per cent in June 2012 started declining with fluctuations to 3.98 in December 2016. The SBs having a lower IRS of 2.26 per cent in June 2010 reached its highest value of 3.28 in December 2012, then proceeded with fluctuations to its value of 2.49 per cent in December 2016. The PCBs had a IRS of 5.49 per cent in June 2010 reached its highest value of 5.95 per cent in June 2014, afterwards gradually declining to 4.74 per cent in December 2016. The FCBs having its highest value of IRS of 9.33 per cent in June 2010 reached a low value of 5.56 per cent in December, 2016 experiencing some fluctuations on the way. For the banking industry the value of IRS was observed to be 5.30 per cent in June 2010 which reached its highest value of 5.79 per cent in June 2012 which with minor fluctuations gradually decreased to 4.71 per cent in December 2016.

As in December 2016 WADR, WALR and IRS – all came down further. For the 6 SCBs the WADR was found to be 5.13 per cent, the WALR was 9.19 per cent and the IRS was found to be 4.06 per cent. For the 2 SBs the WADR was 6.44 per cent, WALR was 8.90 per cent and the IRS was 2.46 per cent. For the 40 PCBs the WADR was found to be 5.42 per cent, the WALR was 10.42 per cent, thus giving an IRS of 4.82 per cent. For the 9 FCBs, the WADR was very low to 1.79 per cent, the WALR was high to 8.21 per cent thus giving a IRS of 6.42 per cent. For the banking industry as in the WADR on 31 December The WADR stood as 5.22 per cent and WALR as 9.93 per cent- thus having a IRS of 4.71 per cent. Table 5 and Figure 2.

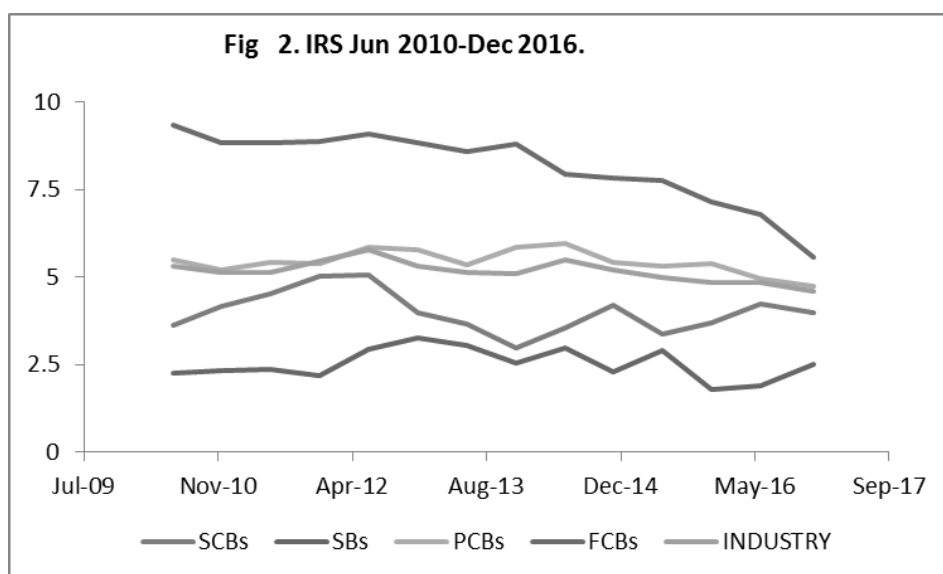
Overall interest rate spread in the country's banking sector fell further recently as the commercial banks slashed their interest rates on both deposits and lending, in recent months the reduction on deposit rate have been heavy and unbearable for the helpless depositors. The Bangladesh Bank is now working to bring down the spread to nearly 4.0 per cent in the near future from the existing level of 4.71 per cent in December 2016. Bangladesh Bank have already advised the banks to reduce their IRS through improving efficiency as well as profitability instead of slashing interest rates on deposits.

The central banker expects that the spread will decrease in the coming months, as Bangladesh Bank is persuading the banks continuously.

Table 5: Recent Movements in IRS by Types of Bank.

Period	Weighted Average of all banks			IRS by bank groups			
	Deposit rate	Lending Rate	IRS	SCBs	SBS/DFIs	PCBs	FCB
Jun 2010	6.01	11.31	5.30	3.64	2.26	5.49	9.33
Dec 2010	6.07	11.19	5.12	4.17	2.31	5.22	8.83
Jun 2011	7.27	12.42	5.15	4.52	2.37	5.41	8.83
Dec 2011	7.55	13.01	5.46	5.01	2.18	5.40	8.89
Jun 2012	8.09	13.88	5.79	5.07	2.95	5.85	9.09
Dec 2012	8.47	13.80	5.33	3.99	3.28	5.77	8.84
Jun 2013	8.54	13.67	5.13	3.66	3.06	5.34	8.59
Dec 2013	8.49	13.58	5.09	2.96	2.53	5.87	8.79
Jun 2014	7.65	13.15	5.50	3.56	2.97	5.95	7.93
Dec 2014	7.25	12.46	5.21	4.19	2.29	5.44	7.84
Jun 2015	6.70	11.68	4.98	3.38	2.91	5.32	7.78
Dec 2015	6.34	11.18	4.84	3.70	1.78	5.39	7.15
Jun 2016	5.54	10.39	4.85	4.23	1.90	4.96	6.80
Dec 2016	5.22	9.93	4.71	3.98	2.49	4.74	5.56

Source: Bangladesh Bank Quarterly.



### Industry Concentration of Deposits Loans and Advances

The Herfindahl-Hirschman Index (HHI) is used to study the extent of concentration prevailing in any market. We analyse the HHI for market share by



types of banks and of the industry as well for both deposit and credit for last 8 years-from 2008 to 2015. Market share of banks is determined by both the deposit and credit. The HHI for deposit indicated a declining tendency for SCBs, SBs and PCBs, while for FCBs an increasing tendency was observed. The compound average growth rate of HHI for deposit was found to be -1.03 per cent for SCBs, -4.00 per cent for SBs, -2.12 per cent for PCBs, and 2.20 per cent for the FCBs. The HHI for credit indicated a declining tendency for only SCBs, while for SBs, PCBs and FCBs an increasing tendency was observed. The annual growth rate of HHI for credit was found to be -1.45 per cent for SCBs, 5.70 per cent for SBs, 0.98 per cent for PCBs, and 2.32 per cent for the FCBs. Table 6 and Figure 3.

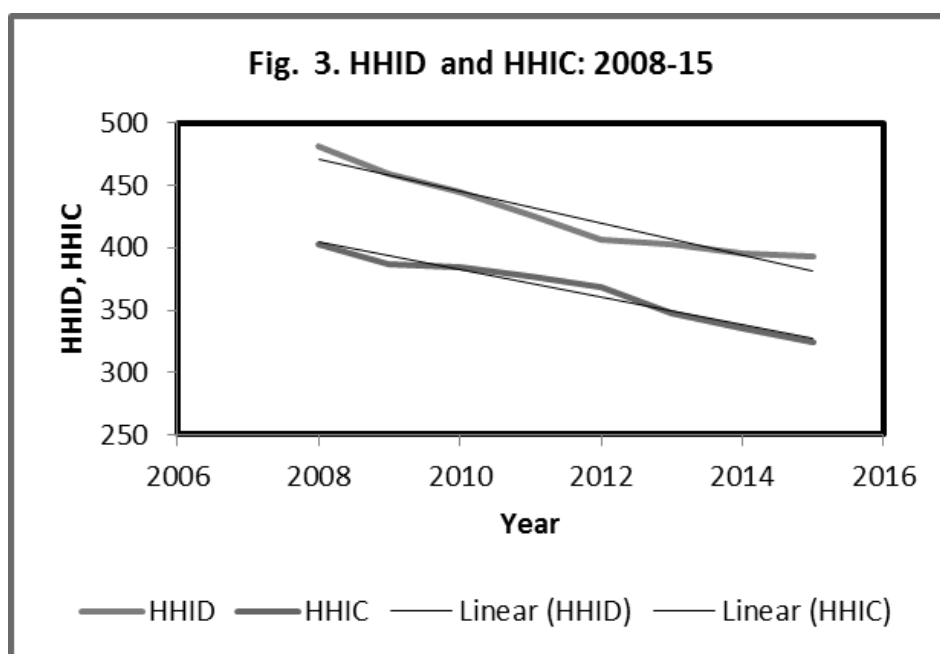
Table 6: Herfindahl-Hirshman Index( HHI) for the Industry on concentration of Deposit and Credit.

Year	HHI for Deposit					HHI for Credit				
	SCBs	SBs	PCBs	FCBs	Industry	SCBs	SBs	PCBs	FCBs	Industry
2008	3187	5040	487/a	2589	482/c	3072	2535	394/a	2638	403/c
2009	3246	5903	472/a	2644	459/c	3093	2558	443/a	2739	387/c
2010	3194	4463	460/a	2860	444/c	2982	3859	476/a	2865	385/c
2011	3104	4485	450/a	3281	426/c	2993	4049	459/a	2984	377/c
2012	3044	4226	444/a	3500	406/c	2978	3742	462/a	3343	368/c
2013	2982	3916	439/b	3352	403/d	2858	3640	453/b	3260	348/d
2014	2960	3828	431/b	3064	396/d	2773	3651	435/b	3099	335/d
2015	2964	3786	419/b	3016	393/d	2773	3738	422/b	3098	325/d
Rate of Change/e	-1.03	-4.00	-2.12	2.20	-2.87	-1.45	5.70	0.98	2.32	-2.03

a/ based on 30 PCBs, b/ based on 39 PCBs (including newly ventured 9 PCBs). c/ based on 47 banks, d/ based on 56 Banks including newly ventured 9 PCBs). e/ compound average annual growth rate (per cent).

For the industry HHI for deposit was 482 in 2008 which gradually decreased to 393 in 2015. The least squares annual growth rate for HHI for deposit was -2.95 per cent and the mean value of the HHI for deposit was 426. The value of HHI for credit was found to be 403 in 2008 which also gradually decreased to 325 in 2015. The least squares annual growth rate of HHI for credit was also found to be -2.95 percent. The mean value for the HHI for credit was found to be 366 per year.

The findings suggests that the banking industry is becoming more competitive from 2008 to 2015 considering the market concentration of deposits and credit. For both the cases, HHI has decreased which indicates an increased competitive environment within the banking industry. Furthermore, the rate of decrease has been same for both the characteristics. There is higher concentration in deposit while compared to credit- difference in mean HHID-HHIC is 60. The linear trend lines for deposit and credit run parallel and downward keeping a distance of 60 index points along the ordinate in figure 3.



### Findings on IRS: Panel Regression Analysis

#### Correlation Analysis

The correlation matrix of the explanatory variables used in the multiple regression analysis was examined. In general the correlation between the bank specific variables is not strong thus suggesting that multicollinearity problems are not severe.

#### Regression Analysis

The result of the Multiple Regression Analysis under Feasible Generalised Least Squares model is given in table 7

Table 7: Multiple Regression Analysis Result of IRS Under Feasible GLS Estimation.

Independent variables	Model 1 8 SCBs	Model 2 30 PCBs	Model 3 9 FCBs	Model 4 47 Banks: industry
NPLTL	.005(.016)	-.001(.012)	.021(.020)	-.018(.007)**
OC_ASSET	-.718(.240)	.180(.138)	-.036(1.083)	-.088(.087)
MSD	-.036(.135)	-.070(.107)	-.312(.427)	-.212(.063)***
WADR	-.170(.119)	-.601(.076)***	-.790(.077)***	-.484(.045)***
NONII_TA	.484(.266)*	.358(.170)**	.195(.076)**	.179(.057)***
NONII_ININC	-.001(.012)	-.018(.009)*	-.001(.001)***	-.005(.001)***
LIQUIDITY	.017(.006)	.009(.010)	.002(.007)	.001(.003)
CAPITAL	-.039(.025)***	-.005(.011)	.008(.007)	-.015(.005)***
SIZE	-.292(.522)	-.239(.287)	.521(.390)	.118(.137)
SRR	-1.465(1.582)	2.703(.851)***	1.273(1.551)	2.302(.792)***
NSD3YR	1.157(1.486)	-2.148(.900)**	5.226(1.574)**	-1.05(.718)
HHI_CR	-.052(.024)**	.065(.014)***	.139(.028)***	.041(.012)***
GDP	-.353(.758)	-.441(.391)	.074(.684)	-.526(.364)
INFL	.483(.220)**	-.215(.108)**	-.337(.193)*	-.126(.102)
Wald $\chi^2(14)$	32.37 (P=.0000)	146.79 (P=.0000)	266.39 (P=.0000)	239.44 (P=.0000)
Panels	homoskedastic. No autocorrelation	:homoskedastic. No autocorrelation	homoskedastic. No autocorrelation	:homoskedastic. No autocorrelation
Banks	8	30	9	47
Year	6	6	6	6
Obs.	48	180	54	282

Note: The figures in parentheses are standard error). \*\*\*, \*\*, \* indicate statistically significant at 1 per cent, 5 per cent and 10 per cent respectively.

### Non-Performing loans

Non-performing loans to total loans ratio (NPLTL) is used as an indicator of credit risk or quality of loans. An increase in provision for loan losses implies a higher cost of bad debt write offs. Given the risk-averse behaviour, banks facing higher credit risk are likely to pass the risk premium to the borrowers, leading to higher spreads. Hence the higher the risk, the higher the pricing of loans and advances to compensate for likely loss. Historically, Bangladeshi banking sector is characterized by high non-performing loans, majority given out by state-owned

banks. Although private banks have on average 5 percent NPL of their total loans, the ratio is still around 20 percent for SCBs. Banks tend to offset the cost of screening and monitoring due to bad loans and/or the cost of foregone interest revenue by charging higher lending rates (Barajas et al., 1999). Randall (1998), and Brock and Rojas-Suarez (2000) find support for the positive and significant association between spreads and nonperforming loans.

The variable non-performing loan (NPLTL) did not have any significant effect on the spread in models fitted separately for bank groups e.g. SCBs, PCBs and FSBs, but it had significant ( $P < .05$ ) negative effect on spread in the model fitted for the industry.

#### **Operating costs:/Overhead costs**

Computed as operating costs as a ratio of total assets (OC\_ASSET). Overhead cost is the ratio of administrative costs to total assets. Banks with higher operating costs are expected to have higher interest spreads. High overhead cost may result from inefficiency in bank operations that may be shifted to bank customers. Banks incur costs of financial intermediation such as screening loan applicants to assess the risk profile of borrowers and monitor the projects for which loans are advanced. An increase in operating costs is expected to have positive influence on interest rate spreads. High operating costs are likely to include costs due to inefficiency leading to higher spreads and hence this variable is commonly used as an indicator of operational inefficiency. A higher cost of financial intermediation will drive up interest rates on loans while depressing interest rates on deposits. The operational cost had significant negative effect on spread in the models for SCBs, FCBs, and Industry, while its effect on spread in PCBs was positive but insignificant

#### **Deposit Rate**

Studies have shown that the spread is sensitive to deposit rate meaning that any shock in spread will eventually transmit to deposit rate (WADR). The effect of deposit on spread was found to be negative in all the models, but its negative effect in the models for SCBs was insignificant, while its negative effect on spread in the models for PCBs, FCBs and Industry was highly significant ( $P < .01$ ).

#### **Non- interest income**

Non-interest income consists of commission, service charges and fees, guarantee fees, net profit from sale of investment securities and foreign exchange profit. It

is likely that banks that have higher non-interest income have less incentive to reduce spread. Two different measures have been used-namely Non-interest income as the ratio of total assets ((NONII\_TA) and Non-interest income as the ratio of interest income (NONII\_IINC). Non-interest income as a ratio of total assets (NONII\_TA) had significant positive effect on spread in all the different bank groups considered-SCBs ( $p < .10$ ), PCBs ( $p < .05$ ), FCBs ( $p < .05$ ) and the Industry ( $p < .01$ ).

#### **Non-interest income to interest income**

It is the ratio of non-interest income to interest income (NONII\_ININC). It is likely that banks that have higher non-interest income have less incentive to reduce spread. Non-interest income as per cent of interest income had significant negative effect on spread in all the models estimated for different bank groups, but its negative effect was insignificant in model for SCBs and moderately significant ( $P < .10$ ) for PCBs and highly significant for FCBs ( $P < .01$ ) and the Industry ( $P < .01$ ).

#### **Market Share of Deposit**

The market share for deposits and loans is used to assess small financial system view of interest rate spread. The market share of deposits (MSD) is the share of individual bank's deposit in a year in terms of total deposits in banks. The market share of loan is the share of individual bank's loans to total loans in a year. This indicator acts as a proxy for the existence of economies of scale and efficient market. While a negative relationship between market share and interest rate spreads predicts the small financial system view, a positive relationship would predict a monopolistic/oligopolistic market structure. The market share of deposits (MSD) had highly significant negative effect on spread in the model for banking Industry ( $p < .01$ ) and its effect on the models for other bank groups was also negative but insignificant.

#### **Market share of loans and advances**

Herfindahl-Hirschman Index (HHI) is the commonly used measure of market concentration. HHI has been computed on the basis of concentration of loans and advances. Market concentration could measure the degree of competition each bank faces in the market. Theoretically, competitive pressures lead to competitive pricing, thus leading to higher efficiency of intermediation process and lower spreads. On the other hand, higher market concentration implies more market

power and less competition and hence is likely to be associated with higher interest rate spreads. Market concentration can also result in oligopolistic market tendencies such as collusion. The industry concentration variable HHIC-measured by Hirshman-Herfindhal Index turned out to be a influential variable in determining spread in all the models. The effect of HHIC on spread in SCBs was negative and significant at 5 per cent level. But its effect on spread in the models for PCBs, FCBs and Banking industry was positive and highly significant ( $P < .01$ ).

### **Liquidity risk**

Computed as the ratio of bank's liquid assets to total loans and advances (LIQUIDITY). The degree to which banks are exposed to liquidity risk varies across banks. A bank with higher liquidity faces lower liquidity risk hence is likely to be associated with lower spreads due to a lower liquidity premium charged on loans. Banks with high risk tend to borrow emergency funds at high costs and thus charge liquidity premium leading to higher spreads. This variable is expected to be negatively related to interest spread. An increase in liquidity reduces the bank liquidity risk, which reduces the interest spread due to a lower liquidity premium charged on loans. The effect of liquidity - ratio of advance to deposits in all the models were positive but insignificant

### **Capital Ratio**

Capital ratio has been obtained as the ratio of shareholders' equity to total assets (CAPITAL). Saunders and Saunders and Schumacher (2000) provide evidence of the positive and generally significant relationship between spreads and capital ratios in developed countries. For developing countries, if there are limited channels for raising capital, such as thin or underdeveloped equity markets, banks will be in a strong position to keep the IRS high. Thus, the capital ratio is expected to be negatively associated with the IRS. Capital ratio had highly significant negative effect ( $P < .01$ ) on spread in the model for SCBs and Industry. Its effect on spread in PCBs was negative and insignificant and its effect on FCBs was positive and insignificant.

### **Bank size**

Bank size is measured as the logarithm of bank's total assets. Ideally one would expect bigger banks to be associated with lower interest rate spreads, arguably because of large economies of scale and ability to invest in technology that would

enhance efficiency. However, to the extent that bank size connotes control of the market in the deposit and loan markets, a positive relationship between interest rate spreads and bank size should not be surprising. The bank size did not exert any significant influence on spread in any of the our bank groups shown in table 2. The effect of bank size on spread was negative and insignificant in the models for SCBs and PCBs, while its effect on spread was negative and insignificant in the models for FCBS and banking industry.

### **Statutory Regulatory Requirement (SRR)**

An increase in the value of statutory regulatory requirement (SRR) of the commercial banks would create a reserve deficiency or decrease in available reserve of depository institutions. If the banks are unable to secure new reserves, they would be forced to contract both earnings and deposits which would result in a decline in the availability of credit and increase the market interest rates. The reverse would happen if the central bank lowers its reserve requirements. The reserve requirements could also lead to disintermediation if the spread between lending and deposit rates widens as a result of its heavy use and may disrupt banks' asset/liability management. The Statutory Regulatory Requirement (SRR) consists of Statutory Liquidity Ratio (SLR) and Cash Reserve Ratio (CRR). The Statutory Regulatory Requirement (SRR) had significant positive effect on spread in PCBs ( $P < .01$ ) and banking Industry ( $P < .01$ ). Its effect on spread in SCBs was negative and insignificant and its effect on spread in FCBs was positive and insignificant.

### **NSD3yr Interest Rate**

The National Saving Deposits 3 yr interest rate (NSD3YR) rate had significant negative effect on spread in the model for PCBs ( $P < .05$ ) and FCBs ( $P < .01$ ). Its effect on spread in SCBs was positive and insignificant while its effect on spread for the model for industry was negative and insignificant.

### **Macroeconomic variables**

The variables used to capture the impact of the macroeconomic factors are real GDP growth and inflation rate. Increased economic activity can heighten demand for loans leading to higher lending rates. On the other hand, increased economic activity can make projects more profitable, reduce defaults, and increase deposits, all of which reduce the spreads. For both variables, negative as well as positive parameters have been observed. The rate of growth of real GDP did not have any

significant effect on spread in any of the four models fitted for different bank groups. The inflation rate had significant positive effect on spread in SCBs ( $P < .05$ ), had significant negative effect on spread in PCBs ( $P < .05$ ) and moderately significant negative effect on spread in FCBs ( $< .10$ ). Its effect on spread in the model for banking industry was negative but insignificant.

### Conclusions

The study identifies several determinants of spread in the commercial banks of Bangladesh. The long-term trend of the deposit rate, lending rate and spread-their causal relationship has also been investigated. In the time series annual data for the period 1975-2016 the least squares annual growth rate of deposit was found to be 0.60 per cent, the annual growth rate of lending rate was -0.10 per cent and the rate of change of spread was -0.70 per cent. The Granger causality test showed that there is no bidirectional causality between spread and lending rate, spread and deposit rate, and even between lending and deposit rate. The banking industry concentration-measured by the level and trend of the Herfindahl-Hirschman Index for both deposit and credit for the period 2008-2015 suggested declining trend in concentration in both deposit and credit-at about the same rate- suggesting competitive atmosphere in banking sector in recent years. In the panel regression analysis on 47 banks for the period 2010-2016, it appears that non performing loans, concentration of market share of deposits and credits, non interest income, capital ratio and statutory regulatory requirement all had significant effect on the spread. The effects of the determinants of spread was not uniform in models fitted for different bank groups- as it is expected. The IMF (2016) in one of its country report on Bangladesh observed:

“Bangladesh’s average nominal and real lending rates, and banks’ interest spreads, are not exceptionally high by international standards. However, both lending rates and spreads are much higher than those for advanced economies, indicating that there is scope for bringing them down. The above cross-country analysis suggests that the main drivers of lending rates and interest rate spreads in Bangladesh are inflation, low credit quality (high NPLs), low recovery ratios for bad loans, and the practice of devolvement.

- Reduce inflation on a sustained basis through prudent monetary and fiscal policies.
- Strengthen bank governance, particularly in the state-owned banks, to help improve asset quality. The very high stock of nonperforming loans in state-owned banks is a cause for concern. Improvements in bank



governance could also help strengthen management practices and reduce operating costs.

- Improve credit information sharing (for instance, through economy-wide credit bureaus) to help banks better assess borrowers' creditworthiness.
- Improve contract enforceability and judicial proceedings for loan collections, foreclosures and the recovery of collateral.
- Minimize or eliminate the practice of forced subscription of Treasury bills and bonds, replacing it with a fully-functioning auction-based approach.
- Automate bank branches, particularly at the state-owned banks – a plan for which is currently under implementation – would help reduce operational risks as well as operating costs.”

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## Annex I

*List of Scheduled Banks (Total 57 Banks) as on 31 December 2016.***A. STATE OWNED BANKS:**

1. Agrani Bank Limited.
2. Janata Bank Limited.
3. Rupali Bank Limited.
4. Sonali Bank Limited.
5. Bank of Small Industries and Commerce Bangladesh Ltd.
6. Bangladesh Development Bank Limited.

**B. SPECIALISED BANKS:**

1. Bangladesh Krishi Bank.
2. Rajshahi Krishi Unnayan Bank.

**C. PRIVATE BANKS:****a) Foreign Banks:**

1. Standard Chartered Bank
2. State Bank of India
3. Habib Bank Ltd.
4. Citi Bank, N.A.
5. Commercial Bank of Ceylon Ltd.
6. National Bank of Pakistan
7. Woori Bank
8. The Hong Kong & Shanghai Banking Corporation Ltd.
9. Bank Al-Falah Ltd.

**b) Private Banks (Incorporated in Bangladesh****excluding Islamic Banks):**

1. AB Bank Ltd.
2. National Bank Ltd.
3. The City Bank Ltd.
4. International Finance Investment and Commerce Bank Ltd.
5. United Commercial Bank Ltd.
6. Pubali Bank Ltd.
7. Uttara Bank Ltd.
8. Eastern Bank Ltd.
9. National Credit and Commerce Bank Ltd.
10. Prime Bank Ltd.
11. Southeast Bank Ltd.
12. Dhaka Bank Ltd.
13. Dutch Bangla Bank Ltd.
14. Mercantile Bank Ltd.
15. Standard Bank Ltd.
16. One Bank Ltd.
17. Bangladesh Commerce Bank Ltd.
18. Mutual Trust Bank Ltd.

19. Premier Bank Ltd.
20. Bank Asia Ltd.
21. Trust Bank Ltd.
22. Jamuna Bank Ltd.
23. BRAC Bank Ltd.
24. NRB Commercial Bank Ltd.
25. South Bangla Agriculture and Commerce Bank Ltd.
26. Meghna Bank Ltd.
27. Midland Bank Ltd.
28. The Farmers Bank Ltd.
29. NRB Bank Ltd.
30. Modhumoti Bank Ltd.
31. NRB Global Bank Ltd.

**c) Islamic Banks**

1. Islami Bank Bangladesh Ltd.
2. ICB Islamic Bank Ltd.
3. Al-Arafah Islami Bank Ltd.
4. Social Islami Bank Ltd.
5. EXIM Bank Ltd.
6. First Security Islami Bank Ltd.
7. Shahjalal Islami Bank Ltd.
8. Union Bank Ltd

The following 9 banks in the private sector which started their operations in FY 2013 were not covered in the present study as their data for the years 2010-2013 would be missing.

1. NRB Commercial Bank Ltd.
2. South Bangla Agriculture and Commerce Bank Ltd.
3. Meghna Bank Ltd.
4. Midland Bank Ltd.
5. The Farmers Bank Ltd.
6. NRB Bank Ltd.
7. Modhumoti Bank Ltd.
8. NRB Global Bank Ltd.
9. Union Bank Ltd

Shimanto Bank Ltd (57<sup>th</sup> Bank. Listed as scheduled Bank on July 21, 2016.)

Source: Bangladesh Bank. Scheduled Bank Statistics. October 2016. and Website WWW.bb.org.bd

## An Enquiry into the Causes and Consequences of Poverty and Inequality in Bangladesh: Sharing the Experiences of USA

M A JALIL\*

**Abstract:** *It has been observed throughout the present world that with the growth of income and GDP the inequality also increasing. This is true equally in case of developed and developing and emerging developed countries. Is it because all these countries are following capitalism and the same consequences they are facing-inequality in income and possession of wealth?*

*One of the main purposes of this article is to investigate the issue in the context of both a newly developing country like Bangladesh and a highly developed country like USA. The objectives of this study are to identify the root causes and consequences of both the poverty and inequality in the societies. Before arriving any conclusion, an extensive investigation has been made for identifying the economic causes, but efforts have been made all other related causes in other disciplines, because this ethic-based topic demands so. Of course, in case of USA, on many above issues we got enough data and information in various studies and those have been mentioned, but in case of Bangladesh, our study suffers from lack of adequate data, insufficient information and very few studies were available. But in Bangladesh, the existence of poverty and inequality is so apparent that it does not require much study. We have found common causes of poverty and inequality in both the countries and the resultant consequences –divisions in the society.*

*The kernel part of the study can be found in concluding part: findings of the study, which is interesting also. In case of Bangladesh, especially the absence of good governance, lack of strict application of law and order,*

\* Professor of Economics, Eastern University, Dhanmondi, Dhaka and President, Bangladesh Economics Teachers Association (BETA). E-mail: [abdul.jalil@easternuni.edu](mailto:abdul.jalil@easternuni.edu).

*prevalence of massive corruption and irregularities often came in our discussion.*

**Key Words:** *Gini coefficient, Gettysburg Address, Sustainable Development Goals (SDGs), MIC, Blue Economy. Human capital, Great Depression, and crony capitalism*

### **Introduction**

The recent available literature on economic development, not only in Bangladesh context but also all over the world, gives us an impression that the economic growth in various countries is on the increase, and some of the countries have achieved tremendous development and a good number of countries are treated as emerging countries threatening balance of power. The rest overwhelming majority of the countries are either underdeveloped/least developed country. But, it appears clearly that as growth is advancing the inequality simultaneously is also going hand in hand and as they are inseparable-they are moving together uninterruptedly in many countries. Although the subject of poverty and inequality is often scrambled together, but they are not the same thing at all. Poverty refers to falling below a certain level of incomes; while inequality, on the other hand, describes the gap between low incomes with high incomes. It is quite possible for the poverty rate to fall while the amount of inequality in a society rises. And in Bangladesh, what exists exactly the same. This has become a usual feature in many countries; and we have accepted it. Although, many emerging countries have shown tremendous improvement in their economic performances-in the growth and size of GDP, per capita income, standard of living, especially in drastically reducing the population under poverty, the inequality has become part of development in such countries. Such countries include China, India, Bangladesh to cite examples. Today, all the countries of the world are following capitalism as the process in principle. Now, is it the process responsible for breeding the same result- the inequality?

One of the main purposes of this writing is to investigate the issue, not only citing the situations of Bangladesh, but also the situations of developed country like USA, who is forerunner in respect of the creation of inequality and all other countries are following the same path. Is it that the same tree in different countries gives us the same fruits, such as mango, papaya, guava; but their taste, color, size and flavor varies due to soil condition, climate, and environment and so on. Similarly, in implementing the policies, although the same or slightly different policies are followed in different countries to cope with the situations producing nearly the same results – inequality similarity. Slight different results may come



out because of the variation of law and order situations of the concerned countries, the level accountability, peoples' awareness, attitude, perception, the level of violation of law and order and corruption etc.

### **The objectives of the study**

- To provide the reader a broad idea about the issues of development, especially of common people and what factors are hampering in their achievements, the prevalence of both poverty and inequality independently and simultaneously working as the main To understand the cause and consequences, one should have sufficient knowledge on the root causes- both political, economic, even social situations-all major issues have been discussed briefly;
- To upkeep them with some ideas how the developed and lastly developing countries, through suitable laws, regulations and administrative machine are utilizing to curve such menace, how far they are successful or is it taking more firm roots, is a burning issue for human civilization-all these are discussed briefly; and
- Finally, to provide our readers a brief idea about the similarities (commonalities in features) that are found in both the countries although one is undeveloped and another highly developed. And the lessons the developing countries should learn from the discussion made here is the most pertinent motive (the driving force in initiating this writing).

Frankly, I am caught in the wave what exactly told by Robert Peston: "The worldwide rise in the inequality has produced torrent a new research into its causes and consequences". What results this exercise will produce, we are not aware, that is to be judged, especially by the readers.

### **The Methodology Followed**

The current writings on these issues, as available in some noteworthy books, journals, newspapers, periodicals and all such information were collected as materials. No empirical study has been made on any country or any situation whatsoever; because the discussion is based on hard realities and empirical evidences (experiences are there for better understanding. Some of them were mentioned here).

### **The Context of Taking this Initiative**

In January, 2017 I had an opportunity to pay a short visit to USA for a few months. During that time I got and gone through, if not vividly, three recent books of one

world-reputed writer the issue of inequality Joseph E. Stiglitz, the world renowned and insanely great economist (according to Paul Krugman) on the issue of poverty and inequality and also a noble laureate. He has been writing ceaselessly on the areas. Obviously, he has emphasized on the situation of USA. Efforts will be made to highlight on Bangladesh situation and to find out variations both in causes and solutions between developed and developing countries. Efforts would also be made to investigate similarities and dissimilarities and also in policies under operations having the ultimate objective to bridge the gaps between the rich and the poor; for which the whole human civilization is at a stake. In the emerging economies, where they are comparatively showing competency in reducing poverty, they deserve praise, but at the same time it has been found, in those countries, instead of decreasing the problem is becoming more acute. We became concerned about how the size of the cake can be increased, many countries are achieving also, what it is being distributed in the society? At the same time, it has been increasingly observed that, irrespective of their economic status- developed and developing- the rich are becoming more rich depriving the poorer section of the community. In broad spectrum, both poverty and inequality are so inter-related that I have tried to deal them together. Like many other economists, my interest in studying poverty and income equality lies in understanding who is poor, why they are poor and more so why the country as a whole is poor and what can be done about them to improve the situation.

### **The Measure of Inequality: Gini Coefficient**

For that matter we care about the total status of development that is the total size of the cake, we have taken also care how it is sliced? Economists have a tool that collapses income inequality into single number, the Gini index. Gini coefficient is named for Italian statistician and demographer Corrado Gini. On this scale, a score of zero represents total equality- a state in which every worker earns exactly the same. At the other end, a score of 100 represents total inequality- a state in which all income is earned by one individual. The countries of the world can be arrayed along with continuum. In 2007, the United States had the Gini index of 45, compared to 28 for France, 23 for Sweden, and 57 for Brazil. By this measure the United States has grown more unequal over the past several decades. America's Gini coefficient was 36.5 in 1980 and 37.9 in 1990. Recent figures can be added to show the current comparative situations.

### **The Root of Inequality in almost in All Countries: The Absence of Democracy with its Full Spirit**

In the introduction of his famous book- *The Great Divide*, it has been cited," No

one can deny that there is a great divide in America, separating the very richest-sometimes described as the 1 percent and the rest. Their lives are different: they have different worries, different aspirations, and different lifestyles.” Again, in his Vanity Fair article” Of the 1 Percent, by the 1 Percent, for the 1 Percent” evoking the lines of President Lincoln’s famous Gettysburg Address, arguing that the real issue of Civil War was to ensure “that government of the people, by the people and for the people shall not perish from the earth.” One can find the root of inequality in the absence of democracy. Stiglitz, while discussing America, has referred the above statement, but, as we see, in many underdeveloped countries like Bangladesh the statement is sent percent true only during election period we feel that it is a democratic country and through election the authoritarian regime is legitimized. But for the rest of the period, they are ignored and the question of meeting their election- pledge becomes a nightmare. Though the democracy allows every voter to exercise voting rights, but the existing rule of game affects the ability and likelihood of exercising right as they wish. Thus, the root of poverty and especially inequality in any country, developed, developing or underdeveloped whatsoever, lie in the political ideology -in politics, the system followed.

### **The First Part: Situation of Bangladesh**

Let us first discuss the composition, character, traits and features of the society of Bangladesh. Heterogeneous elements are working in our society, not at all desirable for developing fraternity among them. How those developed? The present data shows that Muslim are the majority having 92% percent of the total population, on the other hand Hindus were almost 47% when India win freedom from the British regime in 1947. Then after, under different period, Hindus migrated to India and many Indian Muslim opted for the then Pakistan-both East and West Pakistan. Although Hindus mostly left this land, the social division created by them is still in vogue. From the Hindu community the caste system contaminated the Muslim community, although there is no caste system in Islam. In Hindus the caste system is ingrained in religious verdict. The religious leaders in Muslim community rather accepted caste based on occupations in Muslim community even, because it serves their interest. Since almost the Muslims of this country is converted ones, barring microscopic few came from Arab and Middle East countries, whose descendents (actually or pretended) claim superior Muslims and neglected the vast majority. It is mostly cocked stories, no doubt. These are fading slowly in the society, but it will take more and more time to go away with the situation, because its root is deep. The net result is that there is division in the society which has led to the compartmentalization- creating barrier among men and men and retarding development.

Stiglitz has mentioned few causes of poverty and inequality for his country USA but in countries like Bangladesh, where a substantial portion of people are the victim of poverty and massive inequality and the causes are of multifarious in nature. The village leaders, money lenders, teachers influence and create such an environment like unemployment, poverty helplessness, social bindings, social and religious taboos, even village politics and grouping that the voting in favor of the own chosen candidate does not materialize.

The representative chosen, not among from them, nor a person who would fight for their cause, but almost unknown figure, coming from the city with no feeling for them, rather shopping by spending huge money, directly or indirectly- mostly business magnet having the intention to reap benefits, mostly through unfair manner and become more and more rich.

At present, more than 70% of the Members of the Parliament (MPs) are businessmen; but they belong to party in power and in the Parliament, they are silent spectators, they are not willing to raise any issue where government may in embarrassment; they are doing their business as they like and government is running her business as it wishes. Virtually there is no opposition in the Parliament. It appears to me that today most of the business magnets are politicians. Their motives are reinforcing each other; that is why they have combined business and politics. Of course, there are exceptions, but the number is few, both within the cabinet and outside. But why they get interested? Not to serve the nation, not to dedicate their lives for the wellbeing of the toiling mass; but because they want to make money. And if anybody looks on their wealth that has increased between the period of gaining power and after the expiry of the period, it would clearly reveal. Now at this hour most of the MPs are passing days in panic; because they became MPs in last general election uncontested or voter less voting. In coming general election, scheduled to be held after 1 and a half year, they will be facing competition-challenges of election. Of course, there is another group of people and businessmen who run business with the blessings of politicians under different forms. They are not small fry, rather big short. They earn a lot and not in a fair way. When the country is plunged with rampant corruption, irregularities, malpractices and above all unfair ways of becoming wealthy by those who have power and position, what can be left for poorer? The big chunk of cake (GDP) goes in the pockets of very fewer persons and smaller slice is left with to be distributed among 90-95% of the people. Only it can be said that Stiglitz is a fortune citizen of USA and not country like Bangladesh.

The more unfortunate is that again a large chunk of this ill-gotten money is laundered in various countries like Canada, Malaysia, Britain, Australia etc.

according to their convenience. It is really difficult to quantify the amounts, because most of them are done in dubious manner and few come into light after much delay. *The Bangladesh Protidin* (a daily newspaper, December 15, 2016) has mentioned that in last 10 years 4.50 million taka laundered from Bangladesh to other countries for various purchase. Shocking news published in various daily news papers in the first week of May, 2017 is that Global Financial Integrity Report revealed that Bangladesh lost almost USD 75 billion over a decade (2005-2014) and USD 6-9 billion in 2014 only under illicit financial flow from Bangladesh. Unless adequate measures are taken against them, or at least bring them in a tolerable limit, neither the country will drive benefits of development nor the poverty reduction or establishing egalitarian society will come into reality. Now let us discuss at least few studies on poverty and inequality available in Bangladesh. At this point a most recent writings of Rehman Sobhan<sup>4</sup> is worth mentioning, while reviewing the Assembly of International Parliamentary Union (IPU) recently held in Dhaka. The issues discussed are significant for this study. For example, the Chair of the IPU, in his opening address pointed out that ‘one percent world’s elite own 99 percent of its wealth, a frightening inside into an unjust world.’

We can refer here the most pertinent points Sobhan has made. The issue of poverty and inequality has been discussed primarily from economic viewpoint. Of course, he mentioned that such concerns with inequality are not limited to the so-called developing world but also have been made visible in the recently concluded US Presidential Election. However, he pointed out that: ‘The suggested policy responses to inequality both at national and global level expressed through the Sustainable Development Goals (SDGs) have not been able to satisfactory address the problems of inequality.’ It is not surprising that the very countries where poverty has been reduced, the income inequalities and social disparities have widened. Bangladesh obviously is one of them.

He suggested interventions which are designed to challenge inequality by widening and deepening the opportunities for the resource poor and more excluded segments of the population to participate in the development and political process. The discussion is structured under the following heads:

- Structural dimension of inequality
- Policy interventions to challenge inequality

In the elaboration he mentioned that contemporary policy discussion has focused on addressing the symptoms rather than the sources of inequality. The resultant interventions which focus on targeting of development resources to the resource poor (poor in short) and through social safety net are unlikely to resolve the

problem of inequality. The poor are embedded in certain inherent structural arrangements such as insufficient access to productive assets as well as human resources, unequal capacity to participate in both domestic and global markets and undemocratic access to political power. The structural feature of inequality reinforces each other to effectively exclude the poor from participating in the benefits of development or the opportunities provided by more open markets.

In all developing countries including Bangladesh, faced with growing inequality and indeed many middle-income countries, inequitable access to wealth and knowledge disembowels the poor from participating competitively in market place. With the prevailing property structures of the society, the resource poor, particularly in the rural areas, remain disconnected from the more dynamic sector of the market, particularly where there is scope for benefitting from the opportunities provided by globalization. The resource poor, therefore, interface with the dynamic sector of the economy only as primary producers, service providers and wage earners, at the lowest end, of the production and marketing chain, where they sell their produce and labor under severely adverse conditions. This leaves the poor with little opportunity for sharing the opportunities provided by the market economy for the value addition to their labors. He then has discussed in the end some valuable suggestions 'what we can do to challenge inequalities' briefly. In search of our requirement of suitable study which fits our requirement and approach both in case of poverty and inequality, the study conducted by Unnayan Annesha (centre for research and action on development) 5 super scripts has been chosen from many. It would have been found more appropriate and is required. However, if it could cover more recent few years also it could be more desirable. Let us summarize the required portions of the study as follow:

### **Inequality in Income**

The Gini co-efficient measures inequality and the concept has already been discussed; it is the most popular composite indicator that summarizes the extent of concentration (inequality) of household income. Gini co-efficient of income has increased from 0.393 in 2000 to 0.430 in 2010 at rural areas with the growth rate of 0.94 percent, whereas it has decreased from 0.497 to 0.452 at the same period in urban areas with the growth rate of -0.91 percent. Gini co-efficient of income has increased from 0.451 to 0.458 at national level and the growth rate is 0.16 percent during the same period. The Gini co-efficient of income has decreased at national and urban level over the last five years (2005 to 2010) while it has slightly increased in rural areas during the same time (Table 1)

Anu Mahmood, in The Daily Star, May 24, 2017, has furnished some pertinent data and information on inequity issue of Bangladesh. The lower income 70% of

population of Bangladesh possesses 37% of the total income of Bangladesh. Conversely, the higher income 20% of the population of Bangladesh possesses 42% of the total income of Bangladesh; the super rich 5% of population of Bangladesh possesses 25% of total income. Of course, here we could not take the black moneyed people into consideration, who are laundering millions of money from the country to foreign lands every year. If we could do so, the picture would have been horrible. Syed Yusuf Saadat wrote an interesting article, in *The Daily Star* “The Threshold of Inequality”, wherein he has mentioned that the income of

Table 1: Income Inequality in Bangladesh

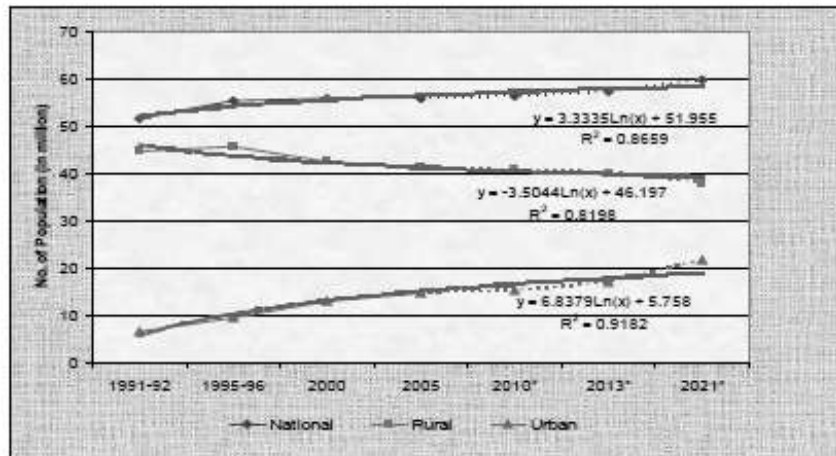
Year	Rural	Urban	National
2000	0.393	0.497	0.451
2005	0.428	0.497	0.467
2010	0.430	0.452	0.458
Growth rate	0.94	-0.91	0.16

the poorest 10 percent of people increased by less than USD 3 AYEAR BRTWEEN 1988 AND 2011, whilst the income of the richest 1 percent increased by 182 times as much (taken from the Ambassador Mario Palma’s article, *The Daily Star*, May 26,2017).

### Population under Poverty Line

Despite progress in reducing the overall incidence of poverty during the last two decades, the number of populations living under poverty line is still increasing. Soaring food price and food inflation, climate change as well as the lack of balanced development throughout the country are attributed for such increase. The number of populations living below the poverty line has increased from 51.6 million in 1991-92 to 56 million in 2005 with an annual average rate of 0.314 percent at national level. If the rate remains the same, the number of populations living below the poverty line might stand at 57.3 million and 59.8 million by 2013 and 2021 respectively. This number has decreased from 44.8 million to 41.2 million in rural areas during 1991-92 to 2005, with an average decrease rate of 0.257 percent per annum. Under the business as usual scenario, the number of populations living below the poverty line might decrease to 40.2 million and 38.1 million by 2013 and 2021 respectively. Whereas, the number of populations under poverty line has increased from 6.8 million in 1991-92 to 14.8 million in 2005 in urban areas with the average increase rate of 0.571 percent per year. Continuation of the current rate may witness an increased population of 17.1 million and 21.7 million by 2013 and 2021 respectively living below the poverty line (Figure 1 below).

Figure 1: Current Situation and Future Projection of Population Living Below the Poverty Line



Source: Authors' calculation based on HIES 2005 and 2010 data

### A Comparison between the Two Situations of Bangladesh and USA

Stiglitz, in a polite manner has pointed out that the ability to influence the political process, either by affecting voting pattern or more affecting the key decision makers, the moneyed man can use his/her money to influence the press (to buy the vote). In underdeveloped countries, such influences are seen in a naked manner. These things are done subtle manner in USA; but In Bangladesh various irregularities are done openly and ugly manner. A dedicated politician, known for honesty will not get party nomination, because he has no money. Thus, possessions of huge money by the future politicians have become a pre-requisite for become a politician in Bangladesh, under the present situation. Politics is increasingly being the matter for richest people of both the countries. The trend is set now in both the countries.

Since inequality issue is the core issue in this writing, it has been evident in various studies that these so-called political-businessmen constitute largest portion of the wealthiest section of people in the country. This is common in USA, one of richest country and in Bangladesh-a poor country. Increasing number of persons are amassing huge wealth in the form of money of other properties, either in their own name or in the name of their relatives or trusted persons of same types of people to conceal from the eyes of NBR or government. In U.S. also same thing is done in other ways.



### **The Main Economic Cause of Poverty in the Context of Bangladesh and How Can Overcome the Poverty?**

Any country is poor, because it is poor. This is the message of vicious circle of poverty- which says- low incomes lead to low saving; low savings retards the growth of capital; inadequate capital prevents introduction of new machinery and rapid growth of productivity; low productivity leads to low incomes. In this way, the whole issue is self-reinforcing. This theoretical definition of vicious circle of poverty exactly fit Bangladesh situation. Immediately after the liberation of Bangladesh, the per capita income was only around \$100, the national savings were negative, more than 80 % people were under poverty line. Many western economists like Faaland, J & Parkinson, J, wrote a famous book on Bangladesh under the title *Bangladesh-a test case of development*. It created a panic among many of us that whether the country with an economy that was prevalent immediately after liberation in 1971 can survive or not. Henry Kissinger termed Bangladesh 'as bottomless basket'. But Bangladesh survived even under those perilous initial days. She is now not only surviving, but being considered again by those western economists as one of the most prospective (promising) country of the world. Now she is getting the status of MIC (Middle Income Country), and hopefully will become a developed country by 2040-41. Although the national savings is 24% of GDP, but country requires national savings around 35% of GDP; so she is dependent on FDI, which is 1.7% of GDP, whereas for Vietnam it is 6%. Thus, investment cannot be made as required. Since the country's resources are meager, very little prospect exists for increasing employment as the people require; although the growth rate is 7%, the half of the working age people are unemployed, naturally their income is poor. So the mass people live in vicious circle poverty. The lack of proper political leadership, the lack of infrastructure, the investment is very inadequate investment in this sector, it is not rising as it should, the billionaires, especially bad billionaires who have found the country a heaven for them through their nefarious role, the government is meddling in too many issues, though required sometime, but not always with fair motive, the nation is still not in a position to make the best use of its location, investment in manufacturing is not as the economy demands, the country can use more debt, but they are coming inadequately, finally poor productivity and human capital hindering the growth of the economy. Wheelan has shown nicely in an attractive manner, by citing examples, how the contributions of few talented persons of any country can change the whole society- by elevating his own fortune and at the same time elevating the lives of common people. There is an opportunity awaiting for Bangladesh- some important 'geographical sweet spots', particularly her sea-

ports-like Chittagong, Mongla and Payra (it is coming up recently, now under construction) have big potentialities of development, but very underused currently. The neighboring countries are eager to utilize these sea-ports, which will fetch much income for Bangladesh and immensely benefit them. Sea-shipping business has also big potentialities. Likewise, blue economy- vast sea-area (almost equal to its land areas) Bangladesh got through international court verdict, are yet to be explored what resources it contains and bring them under use. Her huge populations (more than 160 millions) are passing lives in an awful manner. The government of Bangladesh has, with utmost effort, been able to control inflation. The people feel that in the country things are cheap. Among those factors responsible for slow growth/less development, the main factor is low productivity and low human capital; if we could overcome them, the income of the people and their low standard of live would have substantially increase. Under these circumstances, what is required most is huge investment, especially for infrastructure and seaport buildings. ADB also felt so. We firmly believe that the existing inequality is threatening growth, for which we have more importance on inequality issue. Our suggestion is that the talent pool must be increased, through introducing modern and scientific education and training. The present ratio of investment in human capital building is very inadequate. Another issue causing measure of the people is lack of rules of law, proper accountability, and prevalence of corruption (a brilliant example of country's lawlessness came in *The Prothom Alo*, May 6, 2017, where vividly explained how the contractors are so powerful and care little others and their negligence caused severe damage of embankment and consequently people are facing enormous loss); for which the rent-seekers, in collaboration with bad politicians are exploiting the people, especially common people. If the government sincerely expects that development benefits should reach to the common people, all these must be curbed taking drastic measures. Those who love the country and think for further betterment should support the government in establishing the rule of law in the country. *The Prothom Alo*, dated May 06, 2017 contains news that the power of money (moneyed persons) exceeded the power of administrative machinery and even the power of politics. This is evident from the revised order containing the management of the private banks by the government. If the hemorrhage continues, how can we become a developed nation? We are not interested to elaborate the points mentioned above; because our more interest lies in the issue of inequality. It is to be noted here that recently, investments by both foreigners and locals are on the increase; foreigners are taking projects like construction of rail-roads and its improvement, highways, ports, air-ports etc. and local investors are taking increasing interest in investing special economic zones along with

foreigners. The progress of establishing 100 economic zones, spread over throughout the country, of course mostly in eastern part, must be accelerated. People in general feel that the local investors' greater participation will ensure their interest best. But yet, as we said earlier, that the investment is much low compared to its requirements in Bangladesh. However, there is no similarity between the two countries in respect of status of development and prevailing situations; comparison will not be meaningful. The per capita income of Bangladesh is only \$1500, whereas for USA it is more than \$50000, testifies so. Still, one can use the scales (points considered) while judging Bangladesh' vis-à-vis the case of USA. The results will be just opposite, even item-wise. The developing countries including Bangladesh has more than thousands to learn from USA's position. The most amazing thing is her infrastructure and transport system, which laid the foundation for such a remarkable progress. The more I see the country, the more I wonder; will it be possible one for them to even reach 10% of such achievement? Yet, Bangladesh is a promising country; very soon she will achieve the status of MIC (Middle Income Country) by world bodies, and she has been thriving to be included in the status of developed nation by 2040-41. If not, it may take another ten years. At one time she will achieve so.

In 2016 end, The Dhaka Chamber of Commerce & Industry (DCCI) organized a one-day international conference on 'New Economic Thinking: Bangladesh 2000 and Beyond'. The world renowned experts, like Jeffery D. Sachs of USA, Joseph Di Vanna of UK, and Prof. Remy Prude of Paris joined the conference and expressed that Bangladesh has big opportunities to grow further and laid suggestions also. It may be noted here that Bangladesh earned the favor, help and assistance from both the emerging powers like India and China. They have taken interest in Bangladesh and implementing various big projects. And they are assisting in implementation through their expertise. She is also expecting various development projects to be financed and implemented by a number of developed countries. Among them UK, Canada, Japan, Germany, Iran, UAE etc. deserve to be mentioned. Thus, in such an effort, the experiences of developed countries will act as eye-opener. Meanwhile, although our farmers and growers are not educated or conversant with technology, but through their wisdom and experience quality agricultural products which are fetching foreign markets, especially, European countries. Growers of different products have realized that to get better prices of the products, quality is a must. If we could orient them with required education and impart training (improve human capital) they could excel more. If we could use our most valuable assets- our people –in the most productive way possible, our idea say that the productive capacity of common people will enhance. The

main issue lies here is the creation of more job-opportunities, when even common people will find people will jobs easily and earn more, standard of living will be upgraded. Consequently, poverty will be shortly narrowed down in a very short time. On these issues we have many things to learn from Chinese and Indian experiences of development. For example, India has been able to shift from agrarian economy to a service-based economy without building out significant industrialization. Bangladesh can follow and following also the same suit, but at a slower speed. Dent has made a pragmatic analysis of social, political and economic scenario of both India and Pakistan and made forecasting of both innovation and inflation and spending waves of them. India is likely to be the nation leading Asian nation between the 2030s and 2060s, and ultimately the leading nation globally in GDP with the largest population as well. Compared to India, Pakistan's potential for growth even further out into the future-until 2080 - 2090. In two figures he has shown (in page- 228-229) these. He didn't attempted such exercise for Bangladesh, excepting making a hint- the megacity's goods' market, other than consumers' goods, is under the control of India. Bangladesh should try to recover it.

### **The Issue of Inequality**

The Issue of inequality has become a headache not only to developing countries, such as Bangladesh, who are suffering from absence of law and order, lack of accountability, corruption and malpractices for which proper actions are absent.

But also, in almost the countries, irrespective of status, are suffering with the same problem, more or less. For a long time such situation has been prevailing and in many countries neither the governments nor the people in general are highly concerned, rather they are accustomed with it.

Even in many fast developing and emerging nations like China and India are the victims of inequality of greater degree, so to say. It was a surprising for me when I came across with the writing of Stiglitz, particularly the chapter, 'Of the 1Percent, by the 1 Percent, for the 1 Percent' and one can know about much details he has mentioned. How the 1 percent has been enjoying the larger chunk of income, wealth and resources depriving rest 99 percent of Americans and that is why the title of his recent book is *The Great Divide*. How in a country like USA such situation has developed?

### **Second Part: Poverty and Inequality in America**

Efforts are now being made to explore it. It is to note that in the beginning we will try to summarize what Stiglitz has told.

Stiglitz started the discussion stating the sentiments of a group of people that they look inequality and shrug their shoulders, as if it is a trivial issue how the pie is divided but to them the size of pie is important. 'That argument is fundamentally wrong'. In America, most citizens are becoming worse year after year. There are several reasons for this.

First, growing inequality is a flip side of something else: shrinking the opportunities of 99 percent. That is we diminish equality of opportunity and thereby we are not using some of our valuable assets-our people. Second, many of the distortions that led to the inequality- such as those associated with monopoly power and preferential tax treatment for special interest- undermine the efficiency of the economy. This new inequality goes on to create new distortions, undermining the efficiency even further. To give just one example, too many of our most talented youths, seeing the astronomical rewards, have gone to finance rather than into the fields that would lead to more productive and healthy economy. Thirdly, the most important, a modern economy requires "collective action"- it needs government to invest in infrastructure, education and technology, even government-sponsored research that led to the advances in public health, and so on. America has been suffering from the under-investment in infrastructure in basic research and in the education at all level. When in our eyes we are surprised to see the marvelous achievement of America in infrastructure of all kind, but in the estimation of Stiglitz it is opposite. He raises objections for this negligence in more improvement in this field, I do not know how can I express the conditions of underdeveloped countries- their dismal picture of the governments' spending on infrastructure? But alas, the government has no resource- no ability to do that.

According to Stiglitz all these happen when society's wealth distribution becomes lopsided. The more divided a society becomes in terms of wealth; the more reluctant the wealthy become to spend money on common needs. The top 1 percent may complain about the kind of government we have in America, but in truth they like it just fine: too gridlocked to redistribute, too divided to anything but lower taxes.

Stiglitz has supported economists' inability to explain the growing inequalities in America. The ordinary dynamics of demand and supply have certainly played a role: labor-saving technologies have reduced the demand for many "middle-class", blue collar jobs. Globalization has created worldwide market place, but pitting not for unskilled American workers or cheap unskilled workers overseas. Lowering tax rates for capital gains, which is how the rich receive a large portion of their income, has given the wealthiest Americans close to a free ride. Much of the

today's inequality is due to the manipulation of the financial system. The government lends to financial institutions at close to zero percent interest and provided generous bailouts on favorable term when all else failed. Now America is doing inequality on world-class level. And as it looks as if we'll be building on this achievement for years to come, because it was made possible in self-reinforcing. Wealth begets power, which begets more wealth. 'Virtually all U.S. senators and most of the representatives in the House, are members of the top 1 percent when they arrive, are kept in the office by money from the top 1 percent, and know that if they serve the top 1 percent well they will be rewarded by the top 1 percent when they leave office. By and large, the key executive-branch of policy makers on trade and economic policy also come from the top 1 percent.' We have quoted from Stiglitz, because he has shown the position of top 1 percent drastically.

'America's inequality distorts our society in every conceivable way.' Stiglitz's such remarks require our deep concentration of thinking. Coming back to the issue of top 1 percent, Stiglitz has pointed out that people outside the top 1 percent increasingly live beyond their means. In the same vein, we find in the study of Jeffery D. Sachs as follows: "The wealthiest 1 percent of American households today enjoys a higher total net worth than the bottom 90 percent, and the top 1 percent income earners receives more pretax income than bottom 50 percent.

Trickle-down economics may be a chimera, but trickle-down behaviorism is very real. Stiglitz feels 'Inequality massively distorts our foreign policy'. Again he has opined that top 1 percent rarely serve in the military- the reality is that the "all-volunteer" does not pay enough to attract their sons and daughters, and patriotism goes only so far.

To know the present poverty and income inequality situation of United States and its causes from an internationally reputed expert in this area, in my understanding, we are satisfied; but if one is interested to knowing others views and especially how historically such situation emerged, one will have to search out. We felt interested for that; Ganesh Sitaraman, a well-known lawyer and researcher, in a book on law in chapter-5 titled, 'How Economic Inequality Threatens the Republic', satisfied us. The chapter contains two features- firstly in the beginning, he gave his own views and also an overview of what has been discussed in the chapter by other researchers belonging to various disciplines (which is required in discussing the thick-based issue like this) and secondly, he has started cited from a large number of studies on the area – both met requirement. It may not be possible to mention here all those, but some selected ones are mentioned below. In that way, we got multiple views with different flavors from a variety of scholars.

Sitaraman quoted economist Thomas Piketty who argues that the mid-twentieth century was economically exceptional. Prior to that time, the economic inequality had been pronounced, with economic gains flowing to the wealthiest in the United States and the Europe. Two world wars and the Great Depression wiped out much of their wealth, ushering an age of unprecedented economic equality, broadened economic growth, and relative economic stability. Since 1970s, economic wealth has once again becomes increasingly stratified. Unless public policy changes, Piketty predicts the twenty first century will look more and more like a Gilded Age of late nineteenth century. For those on the losing end of the economy, both economic and political power seems out of balance. This isn't just felt among progressives. According to a 2014 Pew survey, 48 percent of the steadfast *conservatives* believe the economic system unfairly favors the powerful, and 71 percent of the steadfast believe too much power concentrated in the hands of few large companies. Everywhere people look those seems to be evidence that the system serve to perpetuate the privileges of the economically powerful. The banks who engage in criminal activities didn't get prosecuted. Hedge fund managers pay lower tax rates than their secretaries. And no matter who is in charge of Washington, it seems as if many policies never changes.

These two phenomena- collapse of the middle class and Americas increasingly rigid political system – are connected. But the truly terrifying thing is that they are reinforcing each other. As wealth is concentrated in the hands of elite and corporations, they use their wealth and influence to rewrite laws and regulations in a way that helps them to amass even greater wealth and power. The result is downward spiral, a vicious circle in which economic inequality and the capture of political system reinforce each other. This dynamic makes it more likely with each passing days that modern America is losing its character as a republic. The above description is sufficient; but I couldn't check the temptation of citing some more studies. As Sitaraman started such citations at first with Putnam's famous book *Our Kids: American Dream in Crisis*, which focuses of Port Clinton (author's home town in Ottawa Country, Ohio) and its residents from 1959 to 2015, we can follow that. Putnam's case study covers both past and present. The issue under discussion is not absolutely the domain of economics, rather it belongs to various disciplines; it is covered by Sitaraman. In 1955 manufacturing in Ottawa Country accounted for 55 percent in all jobs. But in 1995, the Standard Product factory, army based, and gypsum mines had closed. Manufacturing dropped to just 25 percent of jobs. Wages in 1970s was slightly above the national average, but forty years later they were 25 percent below the national average. In 2012, the average worker in Ottawa Country was paid 16 percent less than his grandparents were in

the early 1970s. The population had grown steadily from World War II through 1970 but soon flat lined and then dropped by 17 percent. Business disappeared. Juvenile delinquency rates grew from the average to three times the national average by 2010. Single parent households doubled. The divorce rate quintupled. Unwanted births doubled to almost 40 percent between 1990 to 2010. And just fifteen years, from 1999 to 2013, child poverty in Port Clinton jumped from 10 percent to 40 percent. At the same time as Port Clinton's working class collapsed, the town saw the emergence of new upper class, wealthy. Wealthy mid westerners noticed Port Clinton's location in Lake Erie and started building gated communities and massive mansions, particularly in the Catawba area, just northeast town.

Putnam's story of the collapse of middle class and the fraying of his home town's community isn't a memoir of one idiosyncratic spot of America. Putnam shows that the trend and challenges facing Port Clinton over the last 30 years. In this connection we can cite Conservative intellectual Charles Murray's *Coming Apart: the State of White America, 1960-2010* traces how American whites have become increasingly divided into upper class and lower class, segregated from each other and ink different habits and behaviors. Again, one can get enough information in a book Chrysie Freeland's *Plutocrats: the Rise of the New Global Super Rich and the fall of Everyone Else (2012)*. This book along with many other books, show the growing divide between the wealthy and the poor.

For a generation, economic growth meant shared prosperity. But since the late 1970s and early 1980s, the Great Compression has turned into what Paul Krugman has called the "Great Divergence". Jeffery D. Sachs pointed out that economic growth was widely shared from the end of war until 1980s. Then all economic benefits tilted towards the rich (see page -23, figure 2.7). Sachs has also shown the segregation of American society into various way, via, red states versus blue states; suburban versus urban centers; rural versus urban; white versus minorities; fundamentalist versus mainline religious dominations; conservatives versus liberals; Sunbelt versus Snowball. These are real.

From 1948 to 1978, wages and productivity marched upward together. But since then growth has far outstripped wages. By 2013, productivity in America was up 243.1 percent since 1948. But wages had risen 108.9 percent. Where did all the benefits from the growth go? Between 1979 to 2008, 100 percent of the growth in income went to the top 10 percent Americans. During this period, the income of the bottom 90 percent actually declined. The twenty wealthiest individuals in America are alone wealthier than the bottom half of the American population-152 million people.



Coupled with the shrinking middle class are their dwindling fortunes. According to Pew, the middle income households took 62 percent of the nation's aggregate income in 1970. By 2015, they were taking home only 43 percent. In the same period, the upper class's share rose from 29 percent to 49 percent of the income. The data shows that the percentage of Americans in the upper class is increasing. The number of highest-income Americans more than doubled from 4 percent to 9 percent between 1971 to 2015.

Economic inequality also threatens the ideal economic mobility- the idea that people can do better than their parents. Krueger plotted a measure of intergenerational mobility- the likelihood that people will inherit their parents' level of income- the Gini coefficient, the standard measure of inequality. What he found was a clear correlation: as inequality rises, the mobility declines.

An important recent study found that children born in bottom 20 percent of the income distribution only have 7.5 percent chance of making it into top 20 percent.

With the shrinking middle class and rising level of inequality, Americans are becoming more and more segregated by income and, as a result less and less likely to interact with people who are dissimilar to themselves.

The increase in income segregation has with a decline in the number of families lived-in middle-class neighborhoods. By 2012, it was only 40.5.

However, our ideas say that enough have been discussed on how poverty and inequality developed in America and their present situation; let us now shorten it. Finally, we want to cite one study. In a study respondent estimated that the top 20 percent in America held 59 percent of the wealth, when in fact it was about 84 percent at the time of study. Their preference, however, was for the top 20 percent to only have 32 percent of the country's wealth. In other words, America dramatically underestimates the amount of inequality in America- and wants a country that far more economically equal.

From the standpoint of a republican system of government, what is more important is that the data shows the collapse of middle and increasing divide between the wealthy and the poor-something that is incompatible with our middle-class constitution.

In drawing conclusion over what has been discussed in this section, it is to be noted that since we had the desire to show the parallel situations of America and Bangladesh in matters of causes, consequences, development and present situations of poverty and inequality, if we get similar types of information on both the cases in above line, it could be more acceptable study. But, as we found very few studies, that too broad in case of Bangladesh and lacking depth compared to

so many studies in American context with much depth; our only consolation is that at one time, when Bangladesh will be capable in this respect, the researchers may find some clues and dimensions of the studies referred here for their guidance. Having bias on legal aspect, from person like Sitaraman, which is more likely, his laborious work helped us tremendously to know not only the economic aspects of the issues, but also it covers various related disciplines, such as, Sociology, Psychology, political etc. aspects too. In that way, we find a total situation prevailing in the arena of poverty and inequality in America.

### **Conclusion**

Although our study covers two countries, situated in extreme poles as regards economic situations and hardly there exist any similarity, even though ironically, we find some traits common in both the countries. These are stated as follows:

In all countries the process of exploitation by the rich, wealthiest, whatever may be their percentage, is almost basically has much common. The victims are poor persons in the society. We find this common phenomenon in almost all countries. Secondly, the society is divided, whether in American society or in Bangladesh. We believe in all countries irrespective of economic status, ideology or in whatever angle you see. This is a great threat to human society. One of the fundamental reasons for that, what Adams lamented, “Modern politics is at bottom, a struggle not for men but for forces”. The study shows how with the shrinking of middle class and rising levels of inequality, American society is increasingly been segregated by income and, as a result, less and less likely to interact people who are dissimilar to them. The rich has formed their own society and they are alienated from the greater society; they think only about their own society, leaving the poor aside. When they do not own the greater society, what you can expect from them? But, nobody will deny that the rich have become so by depriving the poor from their due share. Think of, how the rich in Bangladesh has become more so in case of Garment industry? Obviously, they didn't pay minimum wages to poor workers, particularly women and now in this way they are becoming rich and rich; enjoying a life of pomp and grandeur. Even, the government didn't pursue them; since they form majority in Parliament. In American society how the wealthiest people are utilizing power and resources for protecting their advantages have been clearly discussed.

Thirdly, the political power and process, even Constitution is supporting the cause of the rich, not poor. The king makers are united for achieving their group interest-not for the majority of citizens. Fourthly, one of the major consequences in the society is that the future of the society is bleak. As we know, most of the poor

parents are not in a position to afford better education of their children. It is only the 'fortunate' children of properly educated and well-placed parents understand the necessity of education for their children; but vast majority do not get such facility. And the number of left-over is increasing in the society. In this way, the future generations are deprived; the country is not fully utilizing the potential great resources- human capital. That is a great loss for the society and also for the country as a whole. Even, Stiglitz lamented for the situation in America; developing countries are greater victim in this respect. Ultimately, we all are taking a course greatly hampering the formation of human capital.

Fifthly, we know that human capital is inextricably linked to one of the most important ideas of economics: productivity. Productivity is the efficiency with which we convert inputs into outputs. Again, it is productivity growth what improves our standard of living. Productivity growth also depends a great deal on innovation and technological progress, neither of which is properly understood perfectly. Say, the rich country like United States has yet enough scope of greater productivity growth; she can expect higher productive growth leading to greater prosperity. Now, it does not require thinking that underdeveloped country like Bangladesh, why she is undeveloped? The simple answer is because of low productivity growth and again it is primarily the lack of human capital. It is a known fact that productivity growth also depends a great deal on innovation and technical progress, neither of which is properly understood. As we have found out that, a poverty-stricken country like Bangladesh could not afford such facilities, because of paucity of resources; but it has been possible for United States, which this study testify. The root cause of such situation is poverty and inequality of the country, as we have discussed.

Talent and innovation do not belong to any country and any nation- rather they are assets to all nations. Think of how many talented and innovative people the world could produce, if adequate provisions could be made for them in different countries, particularly in underdeveloped countries, where people in huge number are illiterate, half-educated and lead lives not befitting like human beings; a threat to human civilization. Are the poverty and inequality not creating great havoc for so many people in every society, even in country like America?

It has been found that in every country, there is a section of in the society (e.g. scrupulous politicians, bad billionaires, businessman, rent seekers; in country like Bangladesh also contactors, some engineers, even persons like bureaucrats, lawyers, shop-keepers etc. make money in unfair ways). Sometimes they escape punishment, fly in other countries, sometimes through money, power and bribing they didn't care anybody, even the law-enforcing authority. It also been seen that

the presence of “crony capitalism” in all countries. That is projects that have greater potential to be high profitable do not get financing, while dubious undertakings sponsored by president’s brother-in-law are lavished with government funds. Of course, very and much more in developing countries like Indonesia and Bangladesh, but also it is in country like America, in a less degree, of course. In these countries, the corruption –free people are increasingly becoming minority in the society.

One of the major issues that constantly pains us why in this age of prosperity, millions of people struggling so hard even to survive, not to speak of better life? Although many factors are responsible for, may be few have been discussed here. Our views, what is that the poverty and inequality created by man in the society is a fundamental one. We firmly believe that “The world does not need poor countries in order to become rich countries, nor must some people be poor in order for others to be rich.” Rather, the lopsided distribution of income may cause the rich to squander resources, when other kinds of investment, such as human capital for the poor, would more return. Now, knowing fully every consequence, we do not know long we will remain indifferent to initiate for its solution?

Before drawing the conclusion, we would like cite extracts from two studies. First, an article by Farida Banya Ahmed came in *The Daily Star*, May 05, 2017. The essence of her article is as follows: “The Bangladesh government proudly showcases its GDP growth which is an excellent numeric indicator to make headlines. But, it does very little to deal with the ever growing inequality, dispossession, gross human rights violation, minority oppression, rise of religious fundamentalism and massive corruption.” This does not require further explanation. Second, we would like to refer that Richard Wilkinson and Kate Pickett, in their book *The Spirit Level* (2009) has demonstrated how unequal societies becoming more and more dysfunctional for the poor as well for the rich.

Finally, to usher in a new era of prosperity throughout the world, forming egalitarian society should be our aim. The future of human civilization depends on the vision and mission of the citizens of the world. We are living in a world where the poverty and income inequality, which is increasingly spreading its sways on income disparity / gap, has already created the situation that 100 crores of people cannot earn \$2 a day. And only eight persons have accumulated income and wealth equal to the assets of 50% of total human population. If good sense prevails among them: they feel for their fellow brethren-human beings, without worshipping power, wealth and prosperity for their own, and again if the society amends law and norms, even Constitutions of the countries accordingly, we can obviously build a future worthy of its kind for the human society, otherwise we do not know where it will end.

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## **Footnoting and writing style of the Bangladesh Journal of Political Economy**

1. The Bangladesh Journal of Political Economy will be published in June and December each year.
2. Manuscripts of research articles, research notes and reviews written in English or Bangla should be sent in triplicate to the Editor, The Bangladesh Journal of Political Economy, Bangladesh Economic Association, 4/c Eskaton Garden Road, Dhaka-1000, Bangladesh.
3. An article should have an abstract preferably within 150 words.
4. Manuscript typed in double space on one side of each page should be submitted to the Editor. Submission of electronic version is encouraged.
5. All articles should be organized generally into the following sections: a) Introduction: stating the background and problem; b) Objectives and hypotheses; c) Methodological issues involved; d) Findings; e) Policy implications; f) Limitations, if any; and g) Conclusion (s).
6. The author should not mention his/her name and address on the manuscript. A separate page bearing his/her full name, mailing address and telephone number, if any, and mentioning the title of the paper should be sent to the Editor.
7. If the article is accepted for publication elsewhere, it must be communicated immediately. Otherwise, the onus for any problem that may arise will lie on the author.
8. The title of the article should be short. Brief subheadings may be used at suitable points throughout the text. The Editorial Board reserves the right to alter the title of the article.
9. Tables, graphs and maps may be used in the article. Title and source(s) of such tables should be mentioned.
10. If the Editorial Board is of the opinion that an article provisionally accepted for publication needs to be shortened or particular expressions deleted or rephrased, such proposed changes will be sent to the author of the article for clearance prior to its publication. The author may be requested to recast any article in response to the review thereof by any reviewer.
11. The numbering of notes should be consecutive and placed at the end of the article.
12. Reference in the text and in the Reference list at the end of article should follow it as below:
  - i. Book (one or more authors)**
    - Start your full reference with the last name of the author(s) so it connects with the citation; then give initials or first name(s) of the author(s).
    - Year of publication comes next.

- Next, give the title of book: in italics or underlined (but be consistent throughout your list of references).
- Finally, give the place of publication and name of publisher.

*Example*

**In-text citation:**

(Wilmore 2000)

(Just cite the last name(s) of writer(s) and the year the book was published).

**Full reference:**

WILMORE, G.T.D. (2000). *Alien plants of Yorkshire*. Kendall: Yorkshire Naturalists' Union.

**ii. Chapter from an edited book**

- Start with the full reference entry with the last name of the chapter's author, followed by initials, then state year of publication.
- Then give name (s) of editor(s). The last name of an editor precedes his or her initials, to distinguish editor(s) from the name of the writer of the chapter. Indicate single editor by an abbreviation: (Ed.), or editors: (Eds.).
- State full title of book - in italics or underlined. It is helpful to then give a chapter number.
- Finally, give place of publication and name of publisher.

*Example*

**Citation:**

(Nicholls 2002)

(Cite the name of the writer of the chapter or section in the edited book).

**Full reference:**

NICHOLLS, G. (2002). Mentoring: the art of teaching and learning. In P. JARVIS (Ed.) *The theory and practice of teaching*, chap. 12. London: Kogan Page.

**iii. Referencing journal articles**

- Start with the last name of the author of the article and initials of author.
- Year of publication.
- Title of article (this can go in inverted commas, if wished).



- Name of the journal or magazine (in italics or underlined).
- Volume number and part number (if applicable) and page numbers.

References to journal articles do not include the name of the publisher or place of **publication** unless there is more than one journal with the same title, e.g. *International Affairs (Moscow)* and *International Affairs* (London).

*Example*

**Citation:**

(Bosworth and Yang 2000).

**Reference:**

BOSWORTH, D. and D. YANG (2000). Intellectual property law, technology flow and licensing opportunities in China. **International Business Review**, vol. 9, no. 4, pp.453-477.

The abbreviations, 'vol.' (for volume), 'no.' (for number) and 'pp' (for page numbers) can be omitted. However for clarity and to avoid confusing the reader with a mass of consecutive numbers, they can be included, but be consistent. Note how, in the example above, the initials of the first author follows his last name (Bosworth, D.), but precede the second named (D. Yang). This is the practice illustrated by British Standard in their guidelines with Harvard and both numerical-referencing styles, although you may find the guidelines at your institution may differ on this point.

**iv. Example of referencing an electronic source**

*Example*

**Citation:**

(Dixons Group 2004)

**Reference:**

DIXONS GROUP PLC (2004). *Company report: profile*. [Accessed online from Financial Analysis Made Easy (FAME) database at <http://www.bvdep.com/en/FAME.html> 13 Dec. 2005].

13. Reference mentioned in the text should be arranged in alphabetical order and provided at the end of the article.
14. The Bangladesh Economic Association shall not be responsible for the views expressed in the article, notes, etc. The responsibility of statements, whether of fact or opinion, shall lie entirely with the author. The author shall also be fully responsible for the accuracy of the data used in his/her manuscript.
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16. Each author will receive two complimentary copies of The Bangladesh Journal of Political Economy and 25 off-prints.

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Bangladesh Economic Association  
4/C, Eskaton Garden Road  
Dhaka-1000, Bangladesh  
Tel : 934 5996, Fax : 880-2-934 5996  
E-mail : bea.dhaka@gmail.com  
Website : www.bea-bd.org