

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

21st 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,

* 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 4th 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.

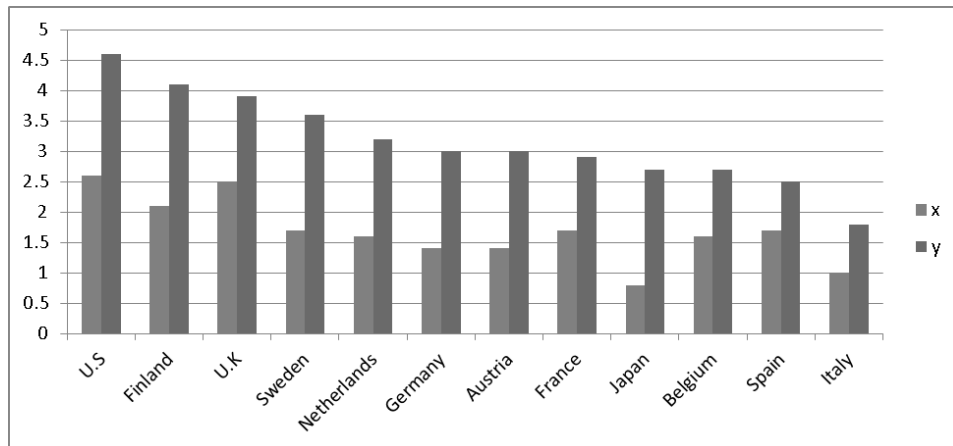
For automation, the world is rapidly depending upon computer and internet system. Which require a central computer system for data and information is called cloud computing. Cloud computing is going to be a big deal for the developed countries, because of its low-cost service, any time any place access 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 21st 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.

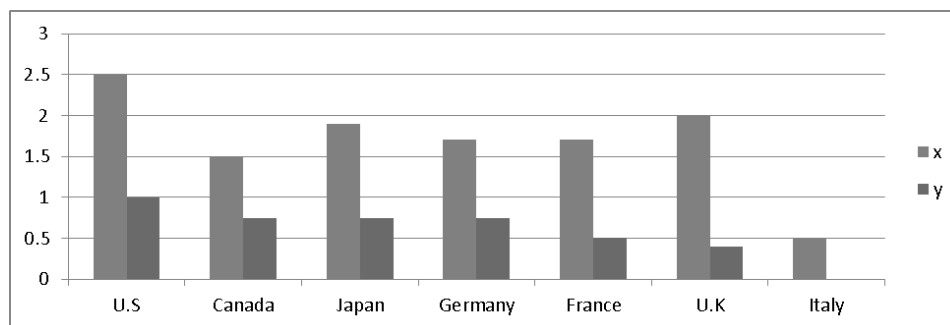
Artificial Intelligence, Economic Growth and Structural Change

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.

References

1. Dec 20, 2016. Executive Office of the president of the USA: Artificial Intelligence, Automation and the Economy.
2. Nov 8, 1995: The White House: Technology and Economic Growth.
3. 2015-16. Russel Norvig. Artificial Intelligence: A Modern Approach.
4. 2008. Introduction to Artificial Intelligence and Expert System: Dan. W. Patterson.
5. 1991. International Economics. Eighth Edition: Kindleberger's New Edition.
6. 2007. Human Resource Management. Text and Cases: Assan Khan.
7. 1994. Management. A Global Perspective: Heinz wehrich and Harold Koontz.
8. 1990. Paradoxes in Public Administration. Dimension and Development.
9. June 2015. Vol. 31. Bangladesh Journal of Political Economy. Bangladesh Economic Association.
10. Nov 5. 2009. Economic Development and Structural Change: Justin Yifu Lin. Lecture in Cairo University. Egypt.
11. Tshilidzi Marwala: Impact of Artificial Intelligence on Economic Theory: University of Johannesburg.
12. June, 2012: The Future of Economic Development Powered by Humane and Artificial Intelligence: Artificial Intelligence Economic Development Corporation.
13. June 2017. The Economic Impact of Artificial Intelligence on the UK economy. PWC.
14. Why Artificial Intelligence is the Future of Growth. Accenture.
15. June, 2012: The Future of Economic Development Powered by Humane and Artificial Intelligence: Artificial Intelligence Economic Development Corporation.
16. May 8, 2017: AI is the future of cyber security, for better and for worse. Roman V. Yampolskiy. Harvard Business School.
17. August 6, 2014. Autonomous Military Technology: Opportunities and Challenges for Policy and Law: James Jay Carafano. Background #2932 on National Security and Defense.

