Households' Waste Material Management and Recycling: A study of Five City Wards Under Rajshahi City Corporation

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Abstract

It is intuitively expected that the moderate growth of population escalates the development programs for ambience in a welfare state. However, the extreme increase in population has a detrimental impact on the environment, directly influencing the atmosphere. Human beings' responsibility is to preserve the environment in case of the high pressure of rapid urbanisation and environmental degradation. The present study aims to discuss households' waste material management and recycling of Rajshahi City Corporation. The analysis is based on primary data, while researchers collected the data from five purposively chosen city wards, respectively, 23, 24, 25, 28, and 29 in 2019. After selecting these Rajshahi city wards, the researchers randomly chose ten households for interview (a total of 50 samples were collected), while the respondents were asked to answer a structural questionnaire regarding their households waste material management and recycling. The analysis of this study had been done through logistic regression models and descriptive statistics. The perception of recycling on educational factors as well as environmental consciousness among the respondents had been analysed. Education level and willingness to

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recycle were illustrated with significant and positive magnitudes in these models. In addition, we got diversified results from the descriptive statistic. Finally, some policy suggestions were addressed in this paper, which will create consciousness about the atmosphere among the city dwellers.

JEL Classification *Q20 · Q52 · Q57*

Keywords *Environmental Quality · Recycle · Waste Management · Descriptive Statistics*

1. Introduction

One of among 17 SDG goals depicts that ensuring sustainable consumption and production patterns. The principal aim of this goal is to foster environmental friendly production, reduction of wastes and boost recycling (Global Goals, 2019). The present study emphasises ensuring the quality of ambience through households' waste material recycling and management. This study aims to consider the families at first as the primary consumption activities start from the households. Therefore, it is crucial to keep our atmosphere neat while beginning from the houses is demonstrated a wise and very reasonable way forward.

Moreover, the world is rapidly urbanising with an escalating growth of population. According to World Urbanization Prospect: the 2018 Revision (United Nations, 2019), there is 55 % people of the total population is residing in urban areas. That is why the importance to have qualitative and sustainable urban places, the human being needs to boost these eco-environment programs.

Bangladesh is a developing country with having lower-middle-income status[1]. It has been observed that the developing countries are lagging compared to developed economies in recycling. One of the reasons behind this is that among the top five recycling countries (Germany, Austria, South Korea, Wales and Switzerland) recycle more than 50 % of their municipal waste (Gray, 2017).

The present study aims to discuss households' waste material management and recycling of Rajshahi City Corporation. The importance of this study is that this city had successfully achieved the least air pollution in 2016[2].

II. The Concept of Recycling and its Importance

Waste has a substantial adverse effect on the ambience; therefore, recycling has a crucial role in protecting our natural environment. If we do not recycle our

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[1] United Nations (2019). World Urbanization Prospect: the 2018 Revision. Department of Economic and Social Affairs, United Nations, page no. xvii.

[2] Emma Graham-Harrison in Rajshahi and VidhiDoshi in Tezpur (2016). The Guardian.

households' waste material, harmful chemicals and greenhouse gases will be released from the rubbishes. Environmental Professionals Network, (2014), "The word recycling means to process materials that we would normally be thrown away into the trash, and make new products out of them. We often throw away valuable metals, glass, paper without realising that all those materials could be reused instead of filling up landfills. Some valuable metals, such as copper, aluminium, iron, and steel, can be recycled easily and turned into profit. If people know which household products can be reused and recycled, they could easily sort them and make money while contributing to the improvement of our environment." The concept is much more related to reduce, reuse and recycle concepts. That means to reuse household items with minimum waste; it sustains the reduction of household waste materials and utilises through reuse(Cousin au, 2019; Leblanc, 2019).

III. Problem Statement

The present study has been designed to look at the present garbage system and houses waste recycling behaviours and other environmental issues. To conduct this study, we have purposively chosen five wards in the city that are much more affected by riverside pollution respectively, Ward 23, Ward 24, Ward 25, Ward 28, and Ward 29. Therefore, the purpose of choosing these wards is that these areas are generally polluted through the garbage, uncontrolled waste material disposals. Even during the rainy season, the disposal of Rajshahi city's wastes is generally mixed with the water Padma River. Moreover, the inhabitants who have a visit by the riverside have experienced bad smells and uncontrolled environmental uses by the local people.

IV. Objectives and the Research Questions of the Study

The main objective of our study is to discuss the scenario of households' waste material management and recycling of Rajshahi City Corporation. The main objective implies addressing several research questions, such as:
(i) How do present and previous education affect the household's waste management system?
(ii) Do households appreciate recycling?
(iii) Does government incentive imply positive behavioural change for recycling?

V. Literature Review

The importance of recycling has been discussed in several papers in the environmental research arena. Magram (2011), Ismail and Jashimuddin (2013),

Delgermaa and Matsumoto (2016) described the worldwide technologies and systems for solid waste recycling and how they can contribute to the domestic economy employment generation and environmental protection. The paper of Abdullah& Salle& Ismail (2017)explored that effective solid waste management (SWM) is very significant in every nation as it determines the sustainability of the environment and ensures the health of the society. There has been very scant research in case of developing countries, including Bangladesh recycling system; however, Abedin and Jahiruddin (2015); Matter, Dietschi, Zurbrügg (2013), Nasrin (2016) addressed the critical aspects like the status of solid waste generation, waste management system and waste management problems in Bangladesh.

Moreover, Strydom & Godfrey (2016) conducted the first national survey on household waste recycling behaviour in South Africa. The challenge of this study is that it triggers shifting consumers "willingness to recycle" and actual "recycling behaviour". Therefore, it puts measures and services to support ongoing recycling behaviour.

In addition, Abdel-Shafy & Mansour (2018), Linderhof et al. (2001), Geng, Tsuyoshi & Chen (2010), Mwanza and Mbohwa (2017), Fiorillo (2013), Ackerman and Gallagher (2002), Strydom (2018), Harder and Woodard (2006), Silvenius et al. (2014), Saphores, Ogunseitan and Shapiro (2012) and others evaluated that using concepts of recycling, the significance, the process and how countries are progressing as well as lagging behind the environmental protection process.

VI. Research Gap and Scope of the Study

Ensuring a sustainable environment is a significant issue throughout the world; therefore, several developed countries have already achieved their goals to preserve the atmosphere. However, there are very scant amount of studies have been done in developing countries like Bangladesh. As a result, introducing households' waste material management through recycling is a challenging issue in Bangladesh.

VII. Study hypothesis

It is intuitively expected that the moderate growth of population escalates the development programs for ambience in a welfare state. However, the extreme increase in population has a detrimental impact on the environment, directly influencing the atmosphere. It is human beings' responsibility to preserve the environment in case of the high pressure of rapid urbanisation in Rajshahi city in

Bangladesh. A null hypothesis is a hypothesis that says there is no statistical significance between the two variables in the hypothesis. Our analysis assumes that the perception of recycling in Rajshahi City Corporation does not affect educational factors and environmental issues. Alternatively, there are either positive or negative impacts on the city corporation's educational factors and environmental issues.

We can write symbolically,

Null hypothesis $H\_o: \beta=0$

Alternative hypothesis $H\_A: \beta \neq 0$

VIII. Data and Sampling Method

The analysis is based on primary data while researchers collect the data from five purposively chosen city wards, respectively, 23, 24, 25, 28, and 29 in 2019. The reasons for the purposive sampling are that these wards have vulnerable people
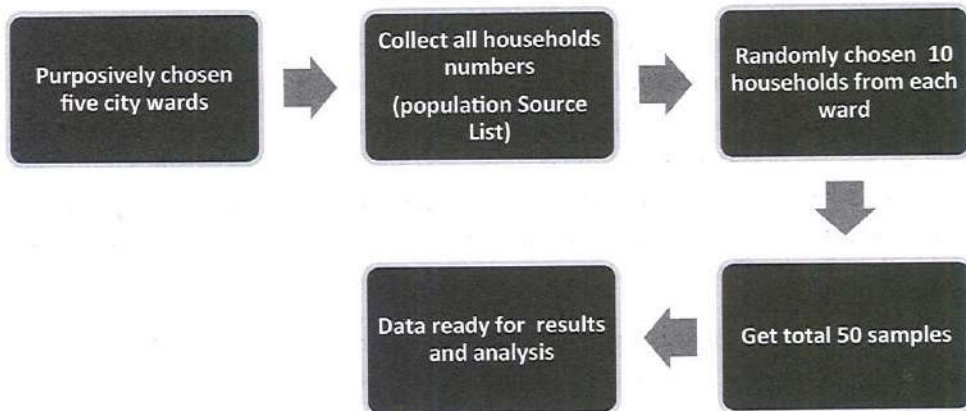

Figure. Flow chart for selecting samples
Source: Authors' estimation.

living in the riverside of Padma and the detrimental effects on our environment. After selecting these Rajshahi city wards, the researchers randomly chose ten households for interview (a total of 50 samples were collected), while the respondents were asked to answer a structural questionnaire regarding their households waste material management.

IX. Models and Results

Logistic Regression Models

We have analysed the data set through the logistic regression model. Logistic regression is a statistical model that, in its basic form, uses a logistic function to

Table 1: Logistic regression function on educational factors on environmental consciousness

Model 1:Per_recycle=α_1+α_2 education+α_3 previous education concerning environment+ α_4 present education concerning environment+ut

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Logistic regression                              Number of obs   =        50
                                                 LR chi2(3)      =     15.39
                                                 Prob > chi2     =    0.0015
Log likelihood = -15.874267                      Pseudo R2       =    0.3265
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perc_recycle	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
edu	1.924474	.889689	2.16	0.031	.180716	3.668233
prvc_edu_e~o	-.9404818	1.544522	-0.61	0.543	-3.967688	2.086725
p_curricul~q	.5378185	.7580407	0.71	0.478	-.9479139	2.023551
_cons	-1.686931	1.947213	-0.87	0.386	-5.503398	2.129535

model a binary dependent variable, although many more complex extensions exist. The following are the logistic regression models.

In our first model, we have analysed the perception of recycling on the education level of the respondents (positive and significant relationship), previous curriculum related to environmental factors (negative and insignificant relationship) and current curriculum containing environmental aspects (positive and insignificant relationship).

Table 2: Logistic regression function on recycling perception related to recycling factors.

Model 2: Per_recycle=α_1+α_2 ask_separion+α_3 collection_problem+ α_4 incentive+ut

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Logistic regression                              Number of obs   =        50
                                                 LR chi2(3)      =     23.32
                                                 Prob > chi2     =    0.0000
Log likelihood = -11.912002                      Pseudo R2       =    0.4946
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perc_recycle	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
if_ask_was~p	4.791389	1.395663	3.43	0.001	2.055939	7.526838
only_prob_~t	-.2694511	1.253611	-0.21	0.830	-2.726484	2.187582
insen_recy~k	-1.792581	1.413513	-1.27	0.205	-4.563015	.9778525
_cons	2.514075	2.982498	0.84	0.399	-3.331513	8.359664

In our second model, we have got exciting results, such as if people are asked for recycling as well as separating their waste materials (they positively agreed to do so, the coefficient value is also significant), whenever the respondent is asked about the problem in the collection by the authority as they need somebody to take their sorted materials (there is negatively insignificant perception). The respondents do not want to take money for the recycling because they are well understood about their environmental protection measurement (the results for the incentive is regarded negatively significant in this model).

Descriptive Statistics

In the following descriptive statistics, it has been implied that 88 % of respondents had known before about recycling and waste management. What is more, 100 % of young learners apply the staffs whatever they learn at schools regarding hygiene and keeping88 % respondents had known before about the recycling and waste management. What is more, 100 % young learners apply to the staffs whatever they learn at schools regarding hygiene and keeping the environment neat and clean.

The following diagram exhibit that among the 50 respondents, 32 (64 %) answered fair or moderate and 17 (34 %) replied well about their satisfaction level with the waste management system of Rajshahi City Corporation. Besides, most people think that the metropolitan area's overall quality has been improved compared to the last five years.
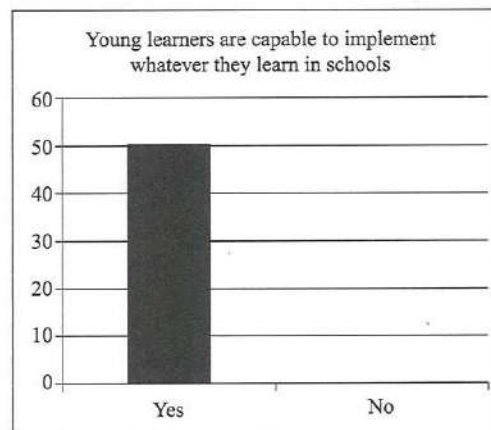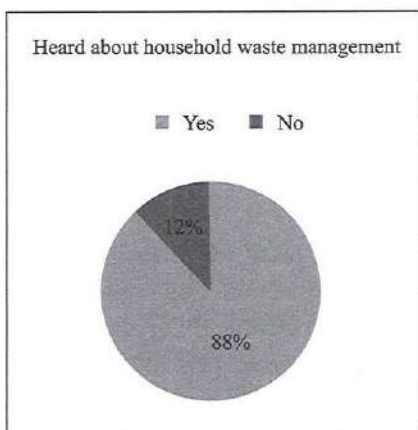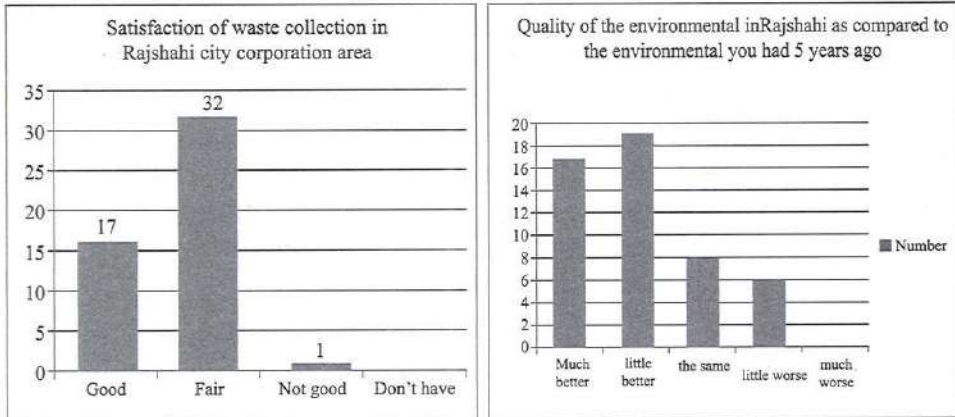

Figure1 and 2: The Basic Environmental Knowledge of the Households and student's behaviours.
Source: Field Survey (2019).

Figures 3 and 4: The City Corporation Role Regarding Waste Management and overall environmental change.
Source: Field Survey (2019).

Conclusions and Policy suggestions

Although there were some difficulties in this research, for instance, it is challenging to search randomly chosen to hold numbers, the households' representatives were hardly willing to explain their real income level, the respondents had very scant information about the environmental factors that is why the research assistants needed to make them understood first and the time frame was limited; the 50 samples were collected within one month only.

How to manage our home waste is a crucial aspect of our day to day life? Whenever it has been asked for individual measurement, we can suggest some specific activities, such as using cloth bags instead of plastic, buying food that has less packaging, modem sitting, design and management of landfills, making much more initiatives regarding reuse, turning wastes into energy and recycling and adopt green technology.

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