

Battery Operated Auto-rickshaw and Its Role in Urban Income and Employment Generation

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ABSTRACT

Battery operated auto-rickshaw, since its advent in local towns of Bangladesh has been playing significant role in increasing income and generating employment opportunities for the poor urban dwellers. Investment on the mode is highly economically beneficial as it involves an income-cost ratio of 1.85. On average, income of individual operators from their previous occupations was BDT 251.75 per day while driving of the mode has doubled it now. In addition, around 21% of the operators were unemployed previously who are now offered with employment opportunities by the mode. Around 38% of total operators were intended to migrate to Dhaka if the mode would have not been introduced in their towns. At all, driving of the mode having some clear benefits over other occupations available in local towns has become a popular medium of income to poor urban dwellers.

Index Terms— Income-cost ratio; Employment generation; Migration reduction; Depressurization of migration; Occupational benefits.

1 INTRODUCTION

BATTERY operated autorickshaw (locally called 'Easy-bike') is a newly added mode of para-transit in urban transportation system of Bangladesh. Since the advent, the mode is being used as a popular transport mode especially to the lower, lower-middle and even middle income people in urban areas of Bangladesh as the mode involves lower travel cost as well as provides much more safety and convenience to the users during travel than other public transport modes [1].

In addition, the mode brings a considerable change in economic structure of local urban areas. Operators of the mode generally come from the poor section of a city as it requires lower initial investment to own a battery operated auto-rickshaw privately [2]. The initial purchasing cost for the mode ranges from BDT 100000 to BDT 120000 and one may get his money back in only seven months [1]. Now, the research is made to investigate the issue more evidently. The research aims at exploring the role of battery operated auto-rickshaws in generating employment opportunities as well as enhancing income for low income urban dwellers in Bangladesh.

2 METHODOLOGIES

2.1 Study Area Selection

Two study areas are selected on the basis of two major criteria as following-

- i. Number of battery operated auto-rickshaws running within the city/town.
- ii. Proximity of the city/town to Dhaka.

Initially some urban areas of Bangladesh are considered on the basis of availability of data regarding the number of battery operated auto-rickshaws. Among them, two have been selected as study areas based upon the criteria mentioned above. Number of battery operated auto-rickshaws as well as physical distances (road/travel distances) of initially selected towns from Dhaka are presented in Table-1.

Table-1: Number of battery operated auto-rickshaws and physical distances of selected urban areas from Dhaka

Urban Areas	Number of Battery Operated Auto-rickshaws Running within the Area*	Distance from Dhaka (km)**
Comilla	8,687	97
Kushtia	2,521	277
Jessore	1,800	274
Faridpur	1,200	145
Meherpur	1,250	286

*Source: Easy-bike Owner's Association, Kushtia & Faridpur, 2011 [3]; District Traffic Police, Comilla, 2011 [4] & The Daily Prothom Alo, 2011 [5]

** Source: Discovery Bangladesh, 2011 [6]

According to the stated criteria and imposing priority on the first one to ensure data quality, Comilla City Corporation Area and Kushtia Municipal Town have been selected as study areas.

2.2 Variable Selection and Data Collection

Variables selected to fulfill the objective are presented in Table-2.

Table-2: List of variables

Objective	Parameters	Variables
Exploring the role of battery-operated auto-rickshaws in urban income and employment generation	Income-cost ratio	Investment/ purchasing cost, Operating and maintenance cost, Income earned
	Economic issues	Net Increase in individual operator's income: - Previous income - Current income Change of occupation: - Previous occupation - Current occupation Employment generation, Migration reduction, Benefits/costs of the occupation over others

Operator opinion survey is conducted extensively to collect data on selected variables. At 95% confidence level and confidence interval of 5, sample size for the operator opinion survey is estimated 384 for both study areas. Adopting stratified sampling method, the sample size is divided into 298 for Comilla City Corporation Area and 86 for Kushtia Municipal Area based upon the percentage share of these two towns in total number of the vehicle. In addition, data regarding the physical and operational characteristics of battery operated auto-rickshaws are collected from the interview with owners of several easy-bike recharging centers located both in Kushtia and Comilla town.

2.3 Literature review

Chandra (2008) [7] showed the calculation procedure of future value of a single amount over 'n' year period of time when different year involves different interest rates, as following:

$$Future\ value\ of\ an\ amount\ at\ the\ end\ of\ n^{th}\ year; P_f = A * (1+r_1) * (1+r_2) * (1+r_3) * \dots * (1+r_n)$$

Where, A = the amount at a year; r₁ = interest rate at 1st year; r₂ = interest rate at 2nd year; r₃ = interest rate at 3rd year; r_n = interest rate at nth year.

3. RESULTS AND DISCUSSION

The contribution made by battery operated auto-rickshaws in urban income and employment generation as found from the study are discussed in below.

3.1 Investment-Cost Ratio

Economic profitability of battery operated auto-rickshaw is analyzed in terms of income-cost ratio. Average purchasing costs for a battery operated auto-rickshaw in corresponding years are shown in Table-3.

Table-3: Purchasing year and average purchasing costs for a battery operated auto-rickshaw

Purchasing Year	Vehicles Surveyed		Average of Purchasing Costs in Purchasing Year (BDT)
	Number of Vehicles Purchased	Percentage	
2008	52	13.54	96916.67
2009	89	23.18	100360.00
2010	137	35.68	104900.00
2011	106	27.60	109793.10

Source: Operator Opinion Survey, 2011

The cost of purchasing the vehicle at different time periods is converted into the base year (i.e. 2011) considering the time value of money. The conversion of year-wise purchasing costs is shown in Table-4.

Table-4: Conversion of year-wise purchasing cost for a vehicle
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into base year, 2011.

Purchasing Year	Average Purchasing Cost* at the Year (BDT)	Inflation Rate** (%)	Conversion ¹	Purchasing Cost at the Base Year (BDT)	Average Purchasing Cost at the Base Year (BDT)
2008	96916.70	8.90	96916.70*(1.09 x 1.05 x 1.08)	120252.10	114447.39
2009	100360.00	5.40	100360*(1.05 x 1.08)	114347.60	
2010	104900.00	8.10	104900*(1.08)	113396.90	
2011	109793.10	10.6	109793	109793.00	

*Source: Operator Opinion Survey, 2011

**Source: Trading Economics, 2012 [8]

Study shows that average purchasing cost of single vehicle in base year is BDT 114447.39. In transposition, average monthly operating cost and income from the mode are respectively BDT 1740.90 and BDT 15969.60 considering 30 working days. Accordingly, annual operating and maintenance costs, and income are respectively BDT 20890.80, BDT 15139.60 and BDT 191635.20.

Each vehicle has an average life span of 2 years as found from the interview with several Easy-bike recharging centers located both in Kushtia and Comilla town. In case of battery operated auto-rickshaw, average life span of battery indicates the life span of the vehicle. Considering the life span, annual share of purchasing cost for a single vehicle is determined BDT 67718.30.

Using these data, income-cost ratio for battery operated auto-rickshaw is calculated as 1.85, which points to the high economic feasibility of the occupation. This provides logical reasoning behind the rapid growth of the mode in local cities of Bangladesh. Table-5 shows the number of battery operated auto-rickshaws in Kushtia and Comilla towns in different years from 2008.

Table-5: Number of battery operated auto-rickshaws in study areas at different years

Year	2008	2009	2010	2011
Kushtia	730	1,150	2,068	2,521
Comilla	3,045	4,332	7,158	8,687
Total	3,815	5,482	9,226	11,208

Source: Easy-bike Owner's Association, Kushtia, 2011 [3]; District Traffic Police, Comilla, 2011 [4] & The Daily Prothom Alo, 2011 [5]

As calculated from the data, the mode has grown at 43% average growth rate per annum between 2008 and 2011.

3.2 Net Increase in Individual Operator and City's Income

¹ Purchasing cost of the vehicle is converted into base year using the formulae to determine the future value of a single amount over 'n' year period of time, where different year involves different inflation rates.

Study reveals that maximum of operators had income between BDT 200 and BDT 300 per day from their previous occupation pointing to an average previous income of BDT 251.75 per day. Table-6 shows the ranges of income of individual operators from their previous occupation as found from the study.

Table-6: Ranges of daily income of individual operators from their previous occupation

Income Range (BDT)	Percentage
< 200	25.00
>= 200 and <=300	65.10
> 300 and <=400	9.11
> 400	0.78

Source: Operator Opinion Survey, 2011

In transposition, battery operated auto-rickshaw driving as an occupation enables operators to earn an average income of BDT 532.32 per day, which is around 2 times to their previous average. Table-7 shows the ranges of current income of battery operated auto-rickshaw operators.

Table-7: Ranges of current daily income of battery operated auto-rickshaw operators

Income Range (BDT)	Percentage
<500	7.29
>=500, <= 600	63.02
> 600 and <= 700	19.53
> 700 and <= 800	9.38
> 800	0.78

Source: Operator Opinion Survey, 2011

On average, the net increase in an individual operator’s daily income contributed by the mode is BDT 280.61. Now, a local city like Kushtia having 2,521 battery operated auto-rickshaws running within the town has an additional income of BDT 707417.81 per day in current year. The amount is incurred solely by the increase in battery operated auto-rickshaw operator’s daily income. Therefore, net income of Kushtia town increased by the mode in 2011 is BDT 25,46,70,411.60, which is estimated considering 360 working days a year. If battery operated auto-rickshaws would have not been introduced, the town’s economy might loss this huge amount of income. Similarly, total 8,687 battery operated auto-rickshaws in Comilla add a total of BDT 87,75,57,265.20 additional income in the town’s economy in 2011. The issue points to that advent of battery operated auto-rickshaws in local urban areas of Bangladesh enables an individual operator to earn a daily income around two times to their previous income and thus contributes to the city’s economic structure significantly.

3.3 Employment Generation

Previous occupation of operators as found from the study is presented in Figure-1.

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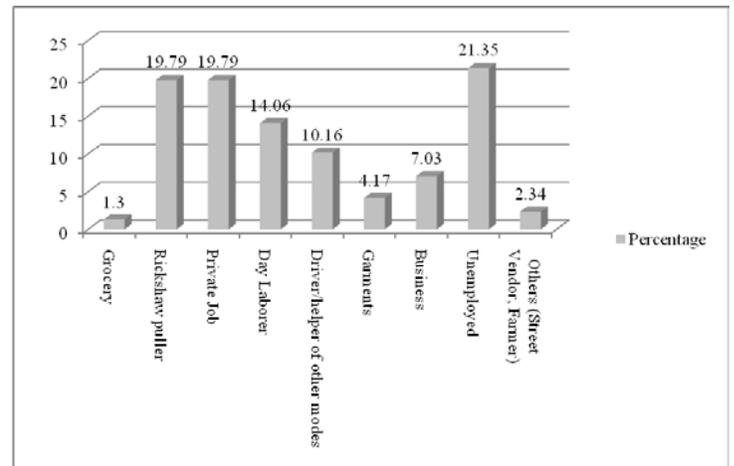


Figure-1: Previous occupations of operators

Study shows that around 21.35% of battery operated auto-rickshaw operators were unemployed before choosing the current occupation. All of the operators who were unemployed previously are aged between 15 and 29 years. Most of them are students now who avail this occupation to earn a handsome income besides continuing their study. Figure-2 shows reasons for choosing battery operated auto-rickshaw as a medium of income by those who were unemployed previously.

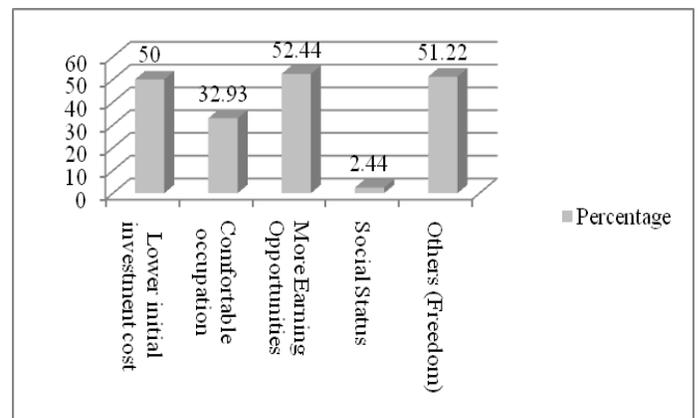


Figure-2: Reasons for choosing battery operated auto-rickshaw driving as occupation

More than 50% of the mode operators who were unemployed previously choose this occupation inclusively for more earning opportunities, occupational freedom and lower investment cost associated with the occupation. In addition, around 32% of operators think that the mode driving is a comfortable occupation to them.

3.4 Migration Reduction and Occupational Benefits over Others

Around 38% of battery operated auto-rickshaw operators were

intended to migrate to Dhaka if the mode would have not been introduced in their towns. Furthermore, around 4% of operators were involved in garments work mostly in Dhaka, who return back to their own town and avail battery operated auto-rickshaw driving as an occupation as this occupation offers some clear benefits over their previous one. This indicates that the mode driving as an occupation also has got potentials to reduce and depressurize migration. In a developing country like Bangladesh, policy makers search for sustainable means to control the rural-urban migration with a view to reducing stress on urban living environments. Battery operated auto-rickshaw having potentials to reduce and depressurize migration would be an effective means in this regard.

In addition, driving of battery operated auto-rickshaw as an occupation renders some benefits over others available in local towns of Bangladesh. This issue encourages the mode operators to switch to the current occupation leaving their previous one. As presented in Figure-3, major reason for switching occupation into the mode driving is greater earning opportunities that the mode involves than all other occupations available within local town for them. Moreover, the occupation involves greater comfort which comes out as second major reason to avail it.

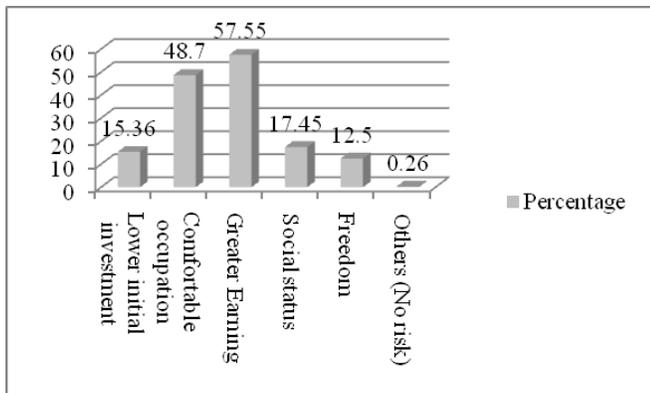


Figure-3: Reasons for switching occupation to battery operated auto-rickshaw driving

In advance, occupation-wise factors that encourage low income urban dwellers to change occupation from their previous one into the mode driving are explored in the research too. It reveals that battery operated auto-rickshaw driving involves greater earning opportunities and comfort than all other occupations operators had previously as illustrated in Figure-4.

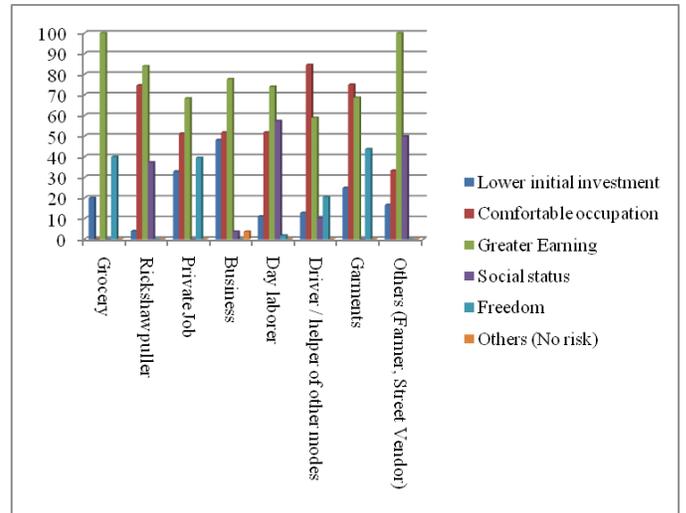


Figure-4: Occupation wise factors responsible for changing occupation

More specifically, driving of the mode is better than grocery in terms of earning opportunities and occupational freedom. It is beneficial over rickshaw pulling, day labor and others in terms of earning opportunities, comfort in occupation and social status. The occupation involves greater earning, comfort and lower investment cost than business. Battery operated auto-rickshaw driving generates greater earning, more comfort and occupational freedom than private jobs (private service holding), driving/helping of other modes and garments work.

4 CONCLUSION

Driving of battery operated auto-rickshaw as an occupation offers some considerable benefits over other occupations usually available for low income people in local towns of Bangladesh. These benefits or factors attract people from varieties of occupations into the mode driving, which results rapid growth of the mode in local cities.

The mode generates employment opportunities especially for the poor urban dwellers at great extent. Because of the advent of the mode, daily average income of a major portion of urban low income community increases substantially than before and so corresponding city's gross income. The occupation with high profitability can be seen as an important means to improve the economic condition of poor section of city since almost all the operators of the mode come from that part.

Moreover, driving of the mode offers greater earning opportunities and comfort than other occupations available for low income people in local towns. This aspect associated with battery operated auto-rickshaw indicates that promoting the mode in local towns of Bangladesh would help in reducing and depressurizing migration from those towns to Dhaka or other big cities.

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