

# Cost-Benefit analysis for freight transportation of Bangladesh

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**ABSTRACT:** Bangladesh has witnessed rapid growth in transport demand, since mid eighties till now, the annual growth rate were 8.2% and 8.4 % respectively for freight and passenger transport demand. This paper describes how benefits and costs vary for multi-modal transport options and travel conditions. It primarily considers road and rail freight transport. It provides an analysis framework which includes estimates of unit cost (Tk/per km/per vehicle) for different travel modes. Different parameters have been used to compare the level of service of different modes and help to have an overall knowledge about the present situation of freight transport in Bangladesh. The result shows that the rate of per unit cost for road and railway are 3.04 tk/ton/km and 1.49 tk/ton/km respectively. In spite of higher cost, during the last two decades, road freight has grown at a compounded growth rate compared to rail. This shift in freight mode is due to long travel time, lack of maintenance and care of railway department, lack of funding in railway department and overall bad image of the railway system of the country.

## 1 INTRODUCTION

The Freight Transport Industry has played a pivotal role in trade and commerce in Bangladesh. Its rising share in relation to the railways is an indication of its popularity. In the last three decades transportation has been one of the priority sectors to the government. (Alam et al., 2008). During this period US \$40 billion has been invested in the transport sector of the country. Particularly the road sector has attracted a major share of the allocation. Bangladesh has achieved a significant growth in the road transport sector over the past twenty years. From 1975 to 2005, the modal share of road transport rose from 35% to 80% for freight. The overall annual traffic growth rate has been nearly 8.2% for freight transport and 8.4% for passenger transport in the past 10 years. (Revival of Inland Waterways: Strategies and Options, Report, World Bank 2007). However, it is expected that this share would go up, albeit gradually. Though emerging as a dominant mode, the industry has not been able to emerge out of the traditional unorganized framework, being as it is (still) dispersed in terms of a large number of small operators.

The specific objectives of this research are collecting freight transport data and other related parameters and estimate future demand after gathering cost data from different sources and calculate unit cost of freight transport and analyze whole process and summarize all constraints and impacts. The effects of improved freight transportation and status of Bangladesh will be discussed also here and cost effectiveness for different parameters affecting freight movement will be analyzed .

## 2 METHODOLOGY

To begin with, we have to first determine or define objectives .Then documenting current process with estimating future requirements. The survey data is then collected along with estimating cost. Since the basic objective is to cost and benefit analysis, we have to document every cost and benefit and perform sensitivity analysis.

### 3 FREIGHT DISTRIBUTION IN BANGLADESH:

The transport system of Bangladesh consists of Roads, Railways, Inland Waterways, Seaports, Airports, Maritime shipping, BRTA, Airways, Civil Aviation Authority and Pipeline. Presently there are about 21000 km of paved roads, 2706 route km of railways (Broadgage-884 km and meter gage-1822 km), 5200 km of perennial waterways, which increases to 8372 km during monsoon. (Dhaka Rail Development Plan (2008), Transport Sector Coordinate Wing (TSC), Bangladesh Planning Commission)

Table 1. Freight Distribution of Bangladesh

Freight Distribution of Bangladesh	percent
road way	60
waterway	14
railway	12

Source: land transport sector in Bangladesh article

### 4 FREIGHT MOVEMENT IN BANGLADESH

Assuming, GDP growth rate to be 4 per cent in near term and GDP-elasticity of freight transport demand to remain at about 1.5, freight transport demand is expected to grow at about 6 per cent per annum. However the corresponding more recent growth rate has been about 9 per cent. The total freight movement (inter- district and intra-district) in Bangladesh is about 63 million tons, with an average lead of approximately 144 Kilometer. Of this total, some 34 million tons are moved inter district using the main transport network.

Table 2 Effects of Improved Freight Transportation

First-order Benefits	Immediate cost reductions to carriers and shippers, including gains to shippers from reduced transit timers and increased reliability.
Second-order Benefits	Reorganization-effect gains from improvements in logistics, Quantity of firms' outputs changes; quality of output does not change.
Third-order Benefits	Gains from additional reorganization efforts such as improved products, new products, or some other change.
Other Effects	Effects that are not considered as benefits according to the strict rules of benefit-cost analysis, but may still be of considerable interest to policy-makers. These could include, among other things, increases in regional employment or increases in rate of growth of regional income.

### 5 UNIT COST CHART

The unit cost chart is prepared by roads and highway department of Bangladesh to find out unit linear value of each category cost .Overall this chart is representing the distribution of external cost of road freight in Bangladesh.

### 6 UNIT COST DIAGRAM FOR MEDIUM CATEGORY TRUCK

This figure represents the distribution of various costs in road freight. Among all other costs, fuel cost dominates over the all other cost.

### 7 UNIT COST DIAGRAM OF DIFFERENT DISTRICTS

From the above chart value a graphical diagram has been prepared for clear under understanding the overall situation. For different districts unit cost are found different for different distances. The differences here is that the unit cost is not increasing with the distance.

Table 3: Unit Cost Data

Item Cost	Unit	Medium Truck	Small Truck
Unit Costs			
Purchase cost of vehicle	Tk'000 per vehicle	1309	949
Cost of new tyre	Tk per tyre	7524	3239
Maintenance Labour cost	Tk per hour	56	56
Overhead cost	Tk'000 per annum	97	52
Crew cost	Tk per hour	24	15
Fel cost	Tk per litre	35	35
Lubricant cost	Tk per litre	48	48

[RHD Road User Cost Annual Report 2005-06]

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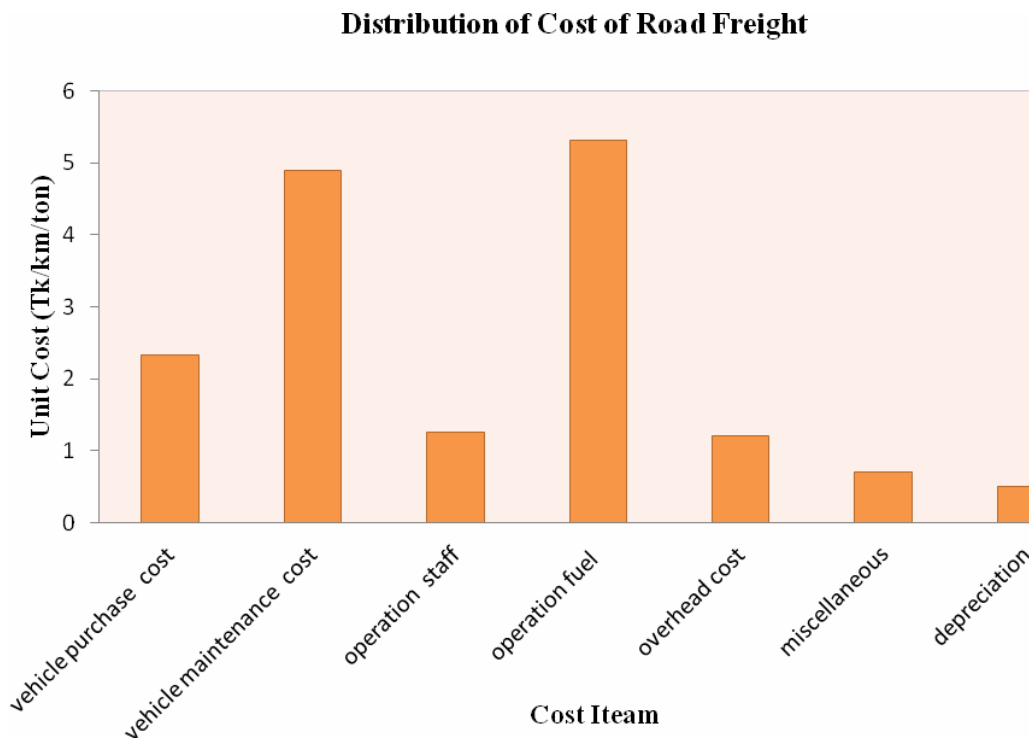


Figure 1 Unit cost diagram for Medium category Truck

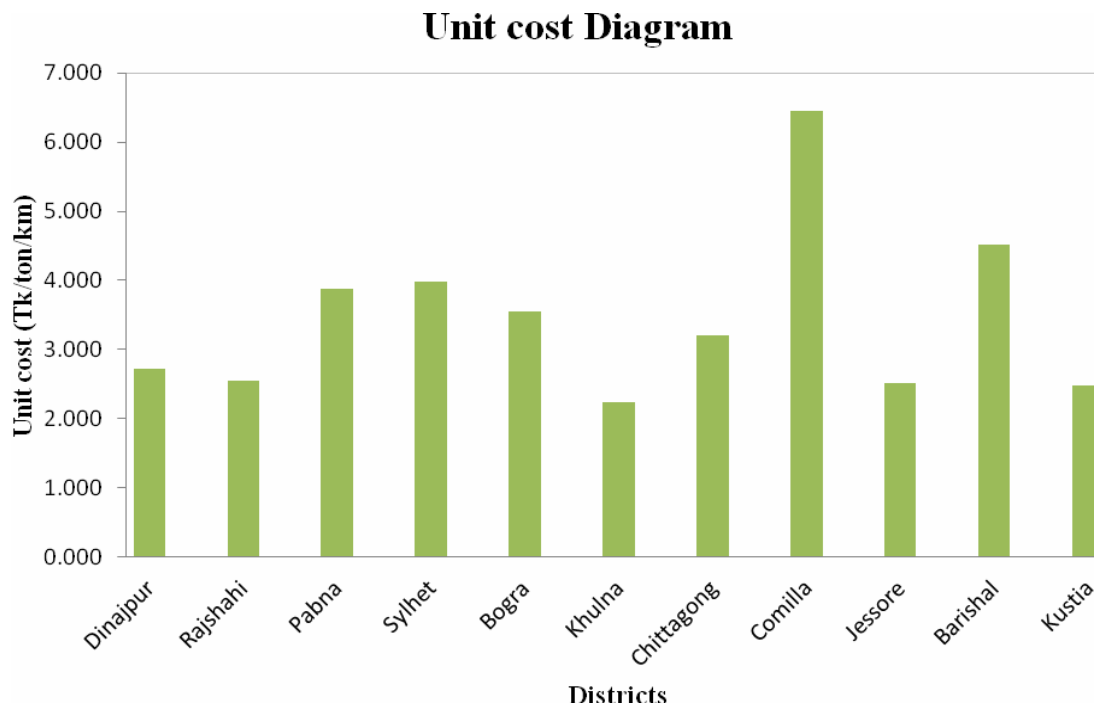


Figure 2. Unit cost diagram of different districts (survey data)

From the figure it is easily visible that unit cost is proportional to the distance of different districts, as the distance increases unit cost also increases.

## 8 DISTRIBUTION OF COST IN RAIL FREIGHT

A chart has been prepared containing the various costs of rail freight in percentage. From the chart we can see that a huge amount of money is spent for repairs and maintenance purposes.

Table 4 Distribution of cost in Rail Freight chart

Percentage	General Administration	Repairs & Maintenance	Operation staff	Operation fuel	Operation other	Miscellaneous	Depreciation
	12.59	36.71	5.55	17.18	9.96	18.01	3.21

(Bangladesh railway information book, 2008)

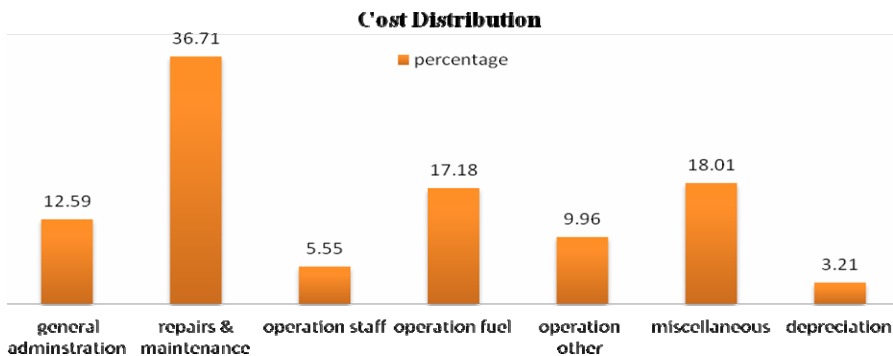


Figure 3. Cost Distribution diagram

## 9 HISTORICAL ANALYSIS

Freight transportation historically has been one of the most heavily regulated sectors. This structure was subsequently extended to for hire motor carriers and barge operators.

Table 5 .Historical analysis table of different transport modes

Name of transport corporation	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Bangladesh railway	1.47	1.46	1.45	1.49	1.49	1.49	1.49
Bangladesh road transportation corporation	1.5	1.5	1.5	1.5	2.47	2.58	3.04

## 10 COST SENSITIVITY ANALYSES

### 10.1 Fuel cost impact on freight transport

Fuel cost was varied from Tk. 40 to 80 based on the current price and approximated future. Figure 4 demonstrates that the impact of cost increment on road is very higher than the rail mode.

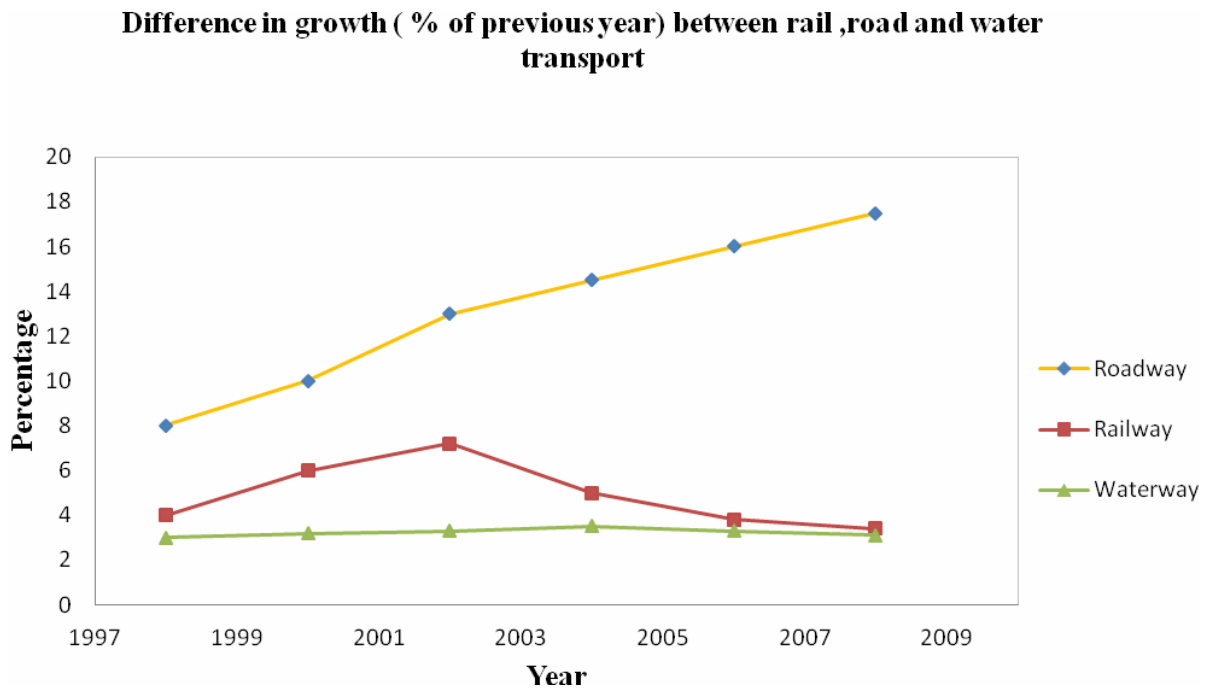


Figure 4. Cost of travel in Roadway and Railway for different fuel price

### 10.2 Impact on growth rate with time

It is noticed that with the time increases, the growth rate is also increasing. Figure 5 shows the growth rate with the time. For the next few decades, proper prediction of growth rate is very significant.

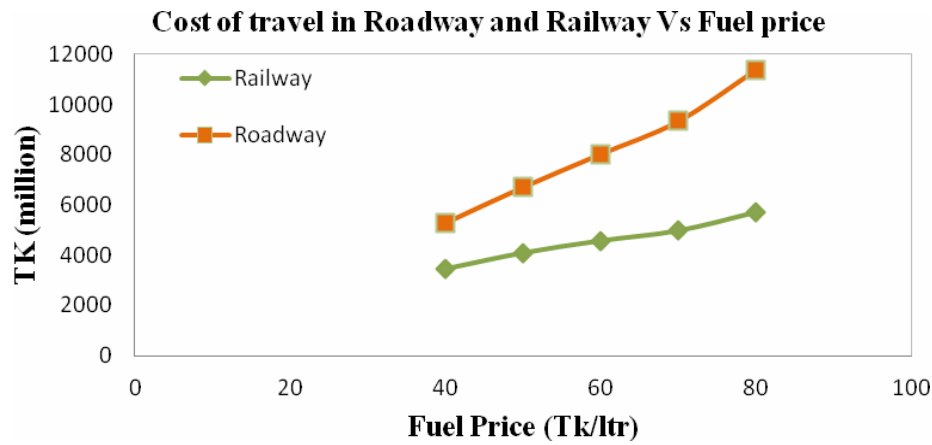


Figure 5. Different in growth in different modes

## 11 LIMITATIONS

### 11.1 Critical Data Gaps

Measurement of the external safety cost of increased truck traffic. This will require measuring the relationship between traffic volume and accident rates and measuring average truck accident rates. This paper is not discussed this situation yet.

### 11.2 Considering Economic Efficiency in Planning

This analysis would entail comparing marginal social costs with user fees, projecting the responses of facility users to changes in the fees, and forecasting the effects of user responses on the benefits derived from freight transportation. Despite the uncertainties in such estimates that have been described in this study, enough is known about the costs of freight transportation that a consideration of efficiency can immediately begin to play a part in government decisions that affect freight efficiency.

## 13 CONCLUSIONS

In this report, the structural changes in transportation scenario of Bangladesh during the past few decades were analyzed. In recent years this role has been reinforced by qualitative changes in the nature and scope of freight services offered. Not only have the costs of freight services declined, but firms in the freight service sector now offer a broader range of enhanced services allowing freight-using firms more flexibility to restructure their logistical and production activities, and thereby achieve non-transportation cost reductions.

Some recommendations are made like-

- All three modes should be equally considered to have a smooth flow of freight movement.
- Road infrastructure should be improved for reducing the external cost of road freight.
- Rail track and locomotives should be improved for efficient movement of freight.
- Development of Inland Water Terminal will increase their freight movement and gain the dependency of people.
- Long term plan should be taken for overall development of freight structures and planning studies should be undertaken for better future of freight transportation.

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