DETERMINATION OF THE VOLUME OF TRUCKS FROM THE DATA OF ANNUAL AVERAGE GROWTH RATE FROM 2005 TO 2030, COST, OPERATIONAL ISSUES, AND ECONOMICAL CONDITION ON NATIONAL HIGHWAYS

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ABSTRACT

The primary intention of the goal of the study is to find out the volume of trucks from the data of annual average daily traffic on national highways. The objective of the survey was to find out the number of trucks that entered and left the truck terminals within 15 minutes. The study also helps to identify the cost and operational issues for observing the present financial and economic condition of the truck industry in our country. The annual average growth rates of trucks from 2005 to 2030 are also included in this study. Besides, a field survey was performed in the truck terminals of Dhaka city to identify the flow of trucks. Our report also includes a breakdown of the findings of the 2008 investigation into the two most popular truck makes. The percentage of trucks by type can also be obtained from the annual average traffic volume data. This is an important factor in calculating the depreciation expenses attributed to various types of vehicles, which is emphasized in our study. The overhead cost consists of office administration and rental charges, garaging, insurance, vehicle excise duty/ VAT, and tolls/route permit fees. Road safety is an essential consideration in urban traffic planning and safety. Globally up to two-thirds of all traffic injuries occur in urban areas, and trucks are significant in the overall context of road accidents. Accident characteristics were examined in terms of severity level, locations, accident rates, time of accidents, casualty class, etc. However, this study will help to understand the current situation of truck movement in our country.

***Index Terms*— National Highway, Trucks, Financial, Economic, Annual Average Growth, Traffic Volume, etc.**

I. INTRODUCTION

Bangladesh is a country with an area of 1, 47,570 inhabitants per square kilometer with around 142 million people. It has approximately 1.5 million motorized and maybe more than 3 million non-motorized vehicles [1]. The appraisal of signalized intersection motifs from existing data is performed to determine efficient travel flow characteristics used in the spatial and contextual design of highways, traffic monitoring programs, roadway maintenance and operation, impact assessment, traffic flow prediction, highway financing, safety program evaluation, and a plethora of related decision-making [2]. The flatbed growth factor is a crucial task for forecasting future truck demand and thus has an important role in the planning and design of new

highway facilities, as well as the execution and reuse of public facilities, traffic crash casualties on national highways, and other issues [3]. This case study attempted to anticipate the truck development trend of several expressways in Bangladesh by monitoring traffic flow data from high-profile highways in recent years [4].

The study of truck flow characteristics is very helpful for developing the movement of trucks on national highways. The carrying capacity and dimensions of trucks differ from vehicle to vehicle and country to country [5]. The Roads and Highways (RHD) of Bangladesh use an 8%–10% growth rate of traffic for the structural design of these highways that need to be upgraded due to the present high traffic volume the

Demand vehicles, about 62% are 2 and 3-wheeled vehicles, and the rest are vehicles of different categories such as cars, jeeps, buses, trucks, pick-ups, etc. The study of truck volume patterns and their variability over time is critical for understanding truck stream characteristics [6]. This study is also important for developing transportation plans, economic analysis of trucks, evaluating the performance of facilities for trucks, etc. On the other hand, a field survey was carried out in different truck terminals to understand the flow of trucks within a fixed period of time [7].

II. Objective of Research

The main objectives of this study are:

- To identify the flow and types of trucks in different truck terminals.
- To find out the volume of different types of trucks on national highways in Bangladesh.
- To examine the cost and growth rate of trucks in Bangladesh in recent "years".
- To observe the secondary data of the different government agencies and then propose necessary actions for the future.
- To provide recommendations to achieve a better truck movement system in Bangladesh in a cost-effective manner.

III. METHODOLOGY

The number of trucks that entered and left the truck terminals in 15 minutes was recorded to identify the types of trucks in these terminals. In the proposed study, the selection of the study areas is performed to observe and analyze the flow of trucks. Firstly, a field survey was carried out to determine the flow of trucks in a fixed period of time.

Secondly, the past reports and data about the truck movement in Bangladesh were collected from various government agencies for the study's purpose, which is considered secondary data in our study. The summary of new trucks and tire purchasing costs is also important to know the financial and economic conditions for maintaining the truck facility in our country.

Finally, the most popular model and the second most popular model of trucks, their engines, tires, weight, and dimensions are also given to find out the quality of different types of trucks. Besides, the forecast growth rate of trucks data was also collected in detail to observe the growth rate of trucks in our country. From the annual average traffic flow of national highway data, the percentage of truck traffic on national highways can be determined. The annual driven and annual hours worked of various categories of vehicles are also provided to find out the utilization condition of trucks in our country. Besides, different types of trucks that are moving on national highways can also be identified from this data. Age and operational life of trucks in Years are also included because it is a current capacity of a vehicle is an essential factor of conveyance in establishing when it should be discarded or sold.

Table 1 shows the average annual forecast truck growth rate (%), which is collected from RHD. This data is assumed from the annual years 2005 to 2030.

Table 01: Average Annual Forecast Truck Growth Rates (%) by RHD

Year	Low Truck	Medium Truck	High Truck
2005-2010	6.03	7.25	8.32
2010-2015	5.95	6.85	8.00
2015-2020	7.10	6.40	6.00
2020-2025	1.40	2.80	5.22
2025-2030	5.10	5.82	6.87

IV. Data Analysis & Result

A. Truck Volume Study on National Highways

Figure 01 shows the percentage of trucks and non-trucks on national highways. Heavy trucks are generally seen transporting heavy goods and materials from one city to another by using national highways. On the N1 national highway, it can be noticed that this highway is used by trucks for containing heavy goods and materials outside the city. Therefore, the graphical presentation states that the national highways that are significant for truck movements are insignificant for motorized vehicles (non-truck).

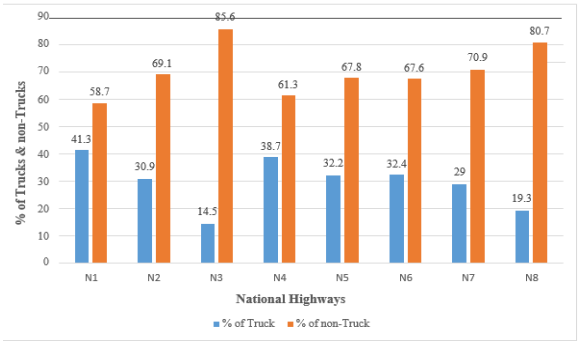

Figure 01: Truck and non-truck traffic on national highways.

Figure 02 shows that the highest flow of heavy trucks is seen in N2 (8.5%), whose routes are Dhaka-Sylhet-Tamabil. The percentage of small trucks is also visible on this highway, which is almost 33.9%, whereas the percentage of heavy trucks (3.6%) is very insignificant compared to medium and small trucks. The percentage of small trucks is also near to that of medium trucks, which is 48.8%, which is the highest of any other national highway. It is also visible that the percentage of medium trucks is higher on N4 (76.5%) compared to all other national highways. The lowest flow of small trucks is seen in the N1 (22.2%), which routes are Dhaka-Chittagong-Teknaf.

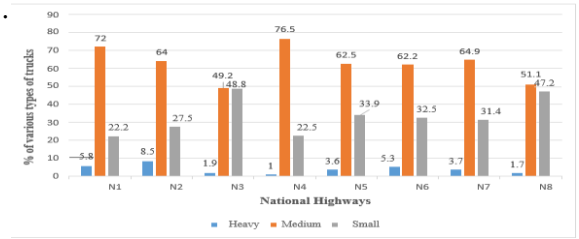

Figure 02: Percentage of Various Types of Trucks on National Highways

B. Utilization and operational life

From Figure 03, it is seen that the percentage of the annual driven is 13.31% and 12.21% of the medium and small trucks, the total annual driven. Besides, the percentage of annual hours worked is 8.48%, and 9.84% of the medium and small trucks make up the total amount of annual hours worked.

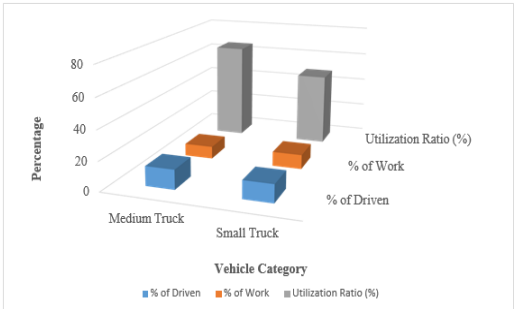

Figure 03: Average Annual Utilization of Trucks

The numerical value of the average age of a small truck is larger (10) compared to a medium truck (9), where the normal service life also varies by the category of truck. The percentage of second-hand small trucks is much higher (43%) than that of medium-sized trucks (12%).

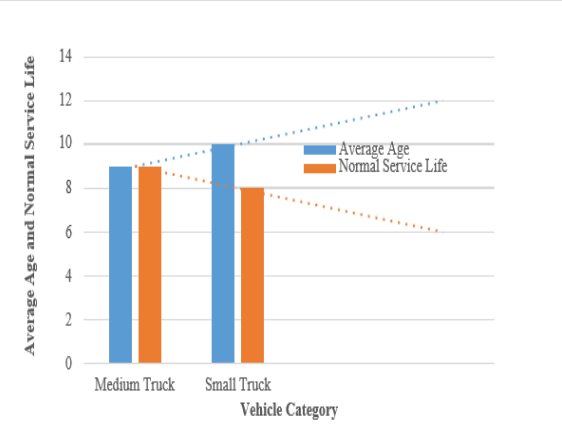

Figure 04: Age and Operational Life of Trucks

C. Result's

But in 2015-2020, the growth rate of low trucks is assumed to be maximum, which is almost 7.10%, whereas the medium trucks and high trucks are 6.40% and 6.00% respectively. From 2020 to 2025, the growth rate of high-sided trucks is the fastest, while low- and medium-sized trucks are insignificant in comparison. Besides, the growth rate of low- and medium-sized trucks is 6.03% and 7.25%, respectively, at this time. The growth rates of the low, medium, and high trucks were 1.40%, 2.80%, and 5.22%, respectively, in these years. In these years, the growth rates of low and medium trucks were 5.10% and 5.82%, which are very close.

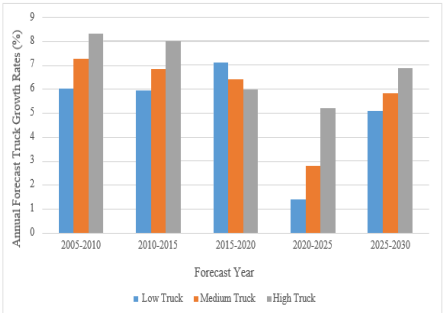

Figure 05: Annual Forecast Truck Growth Rates as a Percentage

For this study, a relationship was derived between the number of trucks in Bangladesh and industrial and agricultural GDP, as shown in Figure 6. It is visible that with the increase in the number of registered trucks, the industrial and agricultural GDP increased gradually. It is seen that when the number of registered trucks is near about 23900, then the growth of GDP is almost 440000. With the increase of registered trucks, which is at about 27200, then the growth of industrial and agricultural GDP is almost 540000.

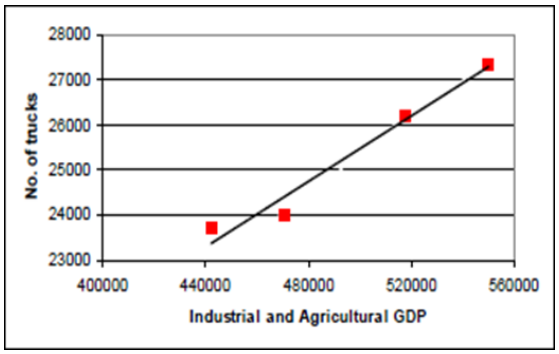

Figure 06: Recent growth in registered trucks related to GDP

Based on the findings of this study, it is visible that the volume of medium and light trucks plays a very significant role on the national highways of our country. The number of registered trucks is increasing day by day with the increase in the facilities of the transportation system. Because it transports heavy goods and materials from one district to another, it is considered a suitable

medium in our country. Besides, for business and industrial purposes, it is one of the most important vehicles in our country. This study also suggests a significant expected growth rate for the truck, which is remarkable. The production of trucks is focused on the improvement of initiatives aimed at enhanced truck utilization, cost analysis, and operating efficiency. The above specifications also show the worst stretches and casualties that occurred due to the vehicles on different highways. The increase in vehicles has the most vulnerable impact on it. Besides the increase in trucks, the industrial and agricultural GDP also increased gradually, which is also remarkable.

ACKNOWLEDGMENT

We want to express our sincere thanks to all those who have inspired us to complete this thesis work. First, the authors would like to remember Al-Mighty Allah for being with us and keeping us mentally and physically fit. The authors would like to express sincere thanks to all their friends and classmates who have helped them by providing valuable suggestions and information throughout this work.

The authors would also like to pay their deepest homage to their parents and family members for their continuous cordial encouragement.

The authors would also like to thank the officers and assistants of Roads and Highway (RHD), Local Government Engineering Development (LGED), Bangladesh Road Transport Authority (BRTA), and other organizations for their help in providing them with secondary data and information.

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