Impact Evaluation of Locomotives Procurement Projects (Phase I~III) in Bangladesh

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Ⅰ. Introduction

Bangladesh has recently achieved the average GDP growth rate of 6.3% per year; among various factors, its 6th largest labor force has been a key driver of growth. However, lack of transportation means hindered the flows of population and products and slowing down economic growth. The transport system in Bangladesh suffered from the lack of budget and ineffective management. This was particularly true for the railway system.

The railway has a small but important role in transportation in Bangladesh: it transports 7% of cargo and passenger traffic. It serves as an intercity train connecting Dhaka and Chittagong, the two major economic zones in the country, and provides an affordable mode of transportation. Compared to other modes of transportation, the railway is considered as safe and reliable. The intercity line is usually sold out, creating about 75% passenger revenue for the Bangladesh Railway (BR). In cargo transportation, 10% of containers are transported to the Chittagong Port, the country's biggest port for export, and many other important goods such as iron, steel, stone and food grains were carried by train.

The railway's importance is growing due to its resilience to climate change and low CO2 emissions, which is particularly relevant to Bangladesh. The government of Bangladesh declared railway improvement as part of its energy efficient transportation strategy and expected to reduce the CO2 emissions according to its sixth Five-Year Plan (2011–2015). The sixth Five-Year Plan set the following goal for the railway sector: increase the railway's market share from 4% to 15%.

However, the railway service has been facing several problems: one of the most problematic areas was the deteriorated railway infrastructure. The poor railway infrastructure including inappropriate rolling stocks was considered one of the physical causes of poor and inefficient railway transport system.

With the recognition of this problem, EDCF supported three consecutive locomotive procurement projects in Bangladesh between 1996 and 2013. By supplying 28 modern locomotives, the projects aimed to improve the efficiency and effectiveness of the railway services. This evaluation was conducted to assess the impact of the three projects.

Ⅱ. Overview and Procedure of Impact Evaluation

1. Purpose of Evaluation

This evaluation aimed to analyze the impact of three locomotive procurement projects supported by EDCF between 1996 and 2013.

The impact of the projects was evaluated in terms of the economic and environmental aspects. The sustainability of the project results was also assessed. The lessons learned from the evaluation results would be used for improving future EDCF projects.

2. Evaluation Method

The randomized controlled experimental design, which is the gold standard of impact evaluation, could not be used for this evaluation due to the project design. Using secondary data was also limited since the relevant data had not been collected.

Consequently, a project theory was developed for impact analysis while various methods were used to examine it. Methods such as literature review, field investigation, survey of railway passengers, and interviews were carried out.

The project theory was as follows: the railway services would be greatly improved in both quantity and quality by operating new locomotives between the Dhaka and Chittagong section. This would improve the flows of people and freight between the two most important economic zones, contributing to the economic growth in Bangladesh. The railway sector itself was known to create large employment and alleviate poverty. Factors

known to influence or to be influenced by the railway services were examined to understand the interaction.

Ⅲ. Evaluation Results

1. Utilization of the Locomotives

1.1 Status of Locomotive Operation

Out of 186 narrow gauge locomotives owned by the Bangladesh Railway, 28 locomotives were procured through EDCF's funding. All 28 locomotives were in service in Dhaka and Chittagong.

2.1 Replacement of the Overused Locomotives

Even though the original intention of the projects was to replace the outdated locomotives, this goal did not materialize. The new locomotives were operated along with the old locomotives. This inability to replace old locomotives decreased the effectiveness of the projects, especially in terms of reliability and speed of railway travel.

2. Economic Impact

The evaluators theorized that the railway projects would have an impact on the economy in two ways. First, the projects would improve service volume and quality which would make the flows of human capital and materials easier, creating a better environment for the market. Secondly, the increased service volume would provide more employment within the sector.

2.1 Improvement of Railway Service and Increase in Passenger Volume

The indicators related to railway services, such as the number of railway locomotives, the volume of passengers and freight, and accident rates

appeared to be gradually improving after EDCF supplied railway locomotives.

The new locomotives were safer and faster than the existing locomotives. The secondary data provided by the Bangladesh Railway (BR) support the improvement in the safety of the railway travel. The number of various types of accidents decreased over the project period.

The secondary data provided by the BR showed a gradual increase in the number of passengers and improved safety between 1993 to 2014. The number of passengers increased by 95%. Considering that the population increased by 33% during the same period, this rise in the passenger number was not merely due to population growth.

However, the speed and regularity of the railway service had not greatly improved. Even though the new locomotives' maximum speed was 120km/h, the average speed of the railway service was 80km/h, which was far slower than the new locomotives' speed capacity. This was caused by two factors; firstly, 85% of the locomotives operated by the Bangladesh Railway were old and ran at much slower speed. In this case, the shortened travel time of new locomotives could not affect the overall average speed since they occupied only about 15% of total narrow gauge locomotives. Second, the railway infrastructure, mainly the rail and signal system, slowed down the speed. Despite the various investments, the rails still remained single line railways and the signal system required updating.

2.2 Economic Growth in Bangladesh and the Railway Service's Contribution

Bangladesh achieved economic development during the project period (1996 – 2010). The poverty rate dropped from 55.2% to 35.2%. In the last ten years, Bangladesh achieved an average GDP growth rate of 6%.

Among other factors, the textile and clothing industries were the key driving force of the country's rapid economic growth. More than two-thirds of the country's merchandise exports were generated from textile and clothing.

In this context, the railway service appeared to have made significant contribution to the economic development in Bangladesh. The textile and clothing industries need to transport huge volumes of people and raw and finished materials between Dhaka and Chittagong. The procured locomotives facilitated such moves of passengers and freight between these two economic zones, and thus contributed to the economic growth in Bangladesh in an indirect manner.

2.3 Increase in Employment

The railway sector tends to employ a large number of people. However, in the case of Bangladesh, railway development had no direct impact on employment.

2. Interaction between the Locomotives and the Environment

Bangladesh faces heavy monsoon rains and regular flooding as a result. Roads and highways are often submerged and damaged by flooding, which hampers ground transportation by car. Industries which are not directly affected by flooding may still experience loss as a result of hampered transport of raw materials and finished products, and commute of employees. In this light, making transportation weatherproof is essential for Bangladesh to achieve sustainable economic development.

The railway is known to withstand the weather conditions better than the road does in Bangladesh due to its geographical trait As expected, there

was no serious obstruction of railway services during the monsoon season. Furthermore, the cost of railway repair was only 10% of the road repair cost.

While enhanced traffic flows are good for economic development, carbon dioxide and other greenhouse gasses emitted by fossil fuel-based transportation also need to be addressed. Climate change can bring unusually serious weather conditions or raise the sea level that can increase the country's vulnerability.

The new locomotives were expected to produce far less greenhouse gasses than the existing locomotives and also the cars per unit of distance. Even though the exact quantity of emission reduction was not able to be measured, the key informant interview with Bangladesh Railway officials showed that the Bangladesh Government was highly satisfied with the lower emission rate produced by the new locomotives.

The passenger survey showed some complaints about the noise pollution around the railway. The noise was being created by the increasing railway operation and poor infrastructure management. However, it appeared not to be too serious according to the evaluation results.

Ⅳ. Lessons Learned and Recommendations

1. Lessons Learned

1.1 Success Factors

The strong political will of the partner country government and corresponding strategy led to the country's high level ownership essential to the success of the projects. Bangladesh developed the Railway Development Plan, based on which it focused on the development of the railway sector. This ownership positively influenced the success of the projects.

The projects were a part of the 47 locomotives procurement project, which was the Bangladesh Railway's long-term project for improving its deteriorated railway infrastructure. EDCF provided financing support for the procurement of a total of 28 locomotives in three phases. This consistency in support led to the greater success and sustainability of the project outcome.

The projects were also a part of the coordinated support from the various donors on the Bangladesh railway system. Between 2000 and 2014, the Asian Development Bank (ADB), the World Bank Group, and Japan also provided support to improve railway infrastructure and governance capacity. This aid coordination, along with the ownership of the Bangladesh government, have helped improve the project outcome.

1.2 Limitations

Even though various efforts were made to improve the railway infrastructure, the poorly integrated railway infrastructure reduced the overall effectiveness of the locomotives. In particular, the battered railways and outdated signal system crippled the speed of the locomotives, reducing the projects' effectiveness on shortening travel time and improving dependable services.

The sustainability of the outcome of the projects was concerning due to the chronic shortages in facilities, budget, and personnel for railway maintenance. Despite various kinds of support from donors and the government's own investment in infrastructure development, insufficient maintenance budget undermined the efforts of the Bangladesh Railway. The maintenance depots were not properly equipped.

2. Recommendations

EDCF should consider supporting similar follow-up projects within the same sector in order to achieve greater impact. The substantiality and effectiveness of project output can be reinforced by repeating the delivery of similar outputs or reinforcing previous outputs.

EDCF should take into account similar activities of other donors. The effectiveness of railway locomotives is influenced by other railway infrastructure such as railroads, signal system, and rolling stocks. However, EDCF may not be able to support all related activities by itself. In Bangladesh, there are various donors providing aid to improve railways and other relevant transport sectors. By working with other donors, EDCF can achieve greater impact for the country.

It is recommended that EDCF carefully assess and build the maintenance capacity of the partner institutions in order to enhance project sustainability. The Bangladesh Railway, the project implementing agency, faced financial limitations which likely reduced the effectiveness and sustainability of the locomotives. This is a common constraint faced by many partner countries which could be addressed either by providing more funding or partnering with other aid agencies which can provide grant aid.

Safety regulation and awareness were largely missing in the railway projects. As the railway infrastructure improves, so will the volume, speed, and frequency of the railway travel. This may lead to increases in accidents. To prevent this from happening, the partner country should enhance its awareness of the risk of accidents by putting safety regulation in place and by properly training the staff of the National Railway Administration.