

BANGLADESH RAILWAY: AN UNEXPLORED POTENTIAL

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Introduction

Bangladesh Railway (BR) the only railway transportation agency of the country is owned and managed by the government. Railway is relatively safe and environmentally friendly transport system. It contributes to poverty reduction by facilitating safe and less expensive movement of large number of people, transportation of essential commodities, mass consumption goods as well as other freights.¹ However, after Independence BR has neither expanded its network nor increased the volume of passenger and freight carriage in line with population or economy. In 1970 there was 2858 km of route operated by the railway which increased to 2877 km at the end of 2014-15.² In 1970 the total passenger carried was 72,885 thousand which reduced to 42,254 thousand in 2005.³ On the other hand the road network expanded from 2500 km to 21302.08 km⁴.

Railway was the most important means of land communication in Bangladesh in early sixties. The Government of Bangladesh as well as donor agencies did not give importance on improved railway system except extension of few main railway stations and that was only to achieve cheap popularity. Some of the services and some of the passenger routes have been privatised on an experimental basis, but desired success has not yet been achieved.⁵ The network is yet to connect Mongla port and does not have any coverage in Barisal division, leaving 8.325 million⁶ people out of rail access.

The transportation cost of passenger and goods is relatively higher by road than by rail. However, in Bangladesh the passenger and goods transportation by road has increased tremendously in comparison to railways. Though individually the cost may be insignificant but when calculated the overall cost incurred becomes a significant burden on the economy. For carrying each loaded 20 feet container from Dhaka to Chittagong, BR charges tk 9,000 whereas by lorry it costs tk

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1. Moving Ahead, National Strategy for Accelerated Poverty Reduction II (FY2009-11), p. 87
 2. Bangladesh Railways Master Plan, p. 8 and BR Information Book 2015.
 3. Bangladesh Railway Master Plan 2013, p. 11-12.
 4. <http://www.rhd.gov.bd/> accessed 28 May 2016.
 5. Mintoo Abdul Awal, Bangladesh Anatomy of Change, The University Press Limited, Dhaka, 2005, p.261
 6. As of 2011 consensus. BSS

18,000⁷. Keeping in mind that Chittagong port handled 1.86 million containers in 2014-15⁸ the overall cost increase in our import/export will exceed by additional billions taka.

Importance of Railway

The Role of Transport in Economic Development

Efficient transport is a critical component of economic development. Transport availability affects development patterns and can be a boost or barrier to economic growth within individual nations.⁹ Transport's contribution to economic development includes the following¹⁰:

- Network effects-linking more locations exponentially increases the value and effectiveness of transport.
- Performance improvements-reducing cost and time for existing passenger and freight movements.
- Reliability-improves time performance and reduces loss and damage; reducing economic drag.
- Market size-access to wider markets adds to economies of scale in production, distribution, and consumption.
- Productivity-transport increases productivity gained from access to a larger and more diverse base of inputs such as raw materials, parts, energy, and labour, and broader markets for more diverse outputs.

Railway Costs and Cost of Alternatives

Railways are an efficient transport mode-concentrating people and goods and transporting them over a fixed route. Rail transport is generally more fuel efficient than road transport; in USA, rail freight is on average 63% more fuel efficient than road transport.¹¹

7. Discussion with Syed Zahurul Islam, Director Traffic and Director PR, Bangladesh Railway, on 27 June 2016.

8. <http://cpa.gov.bd/containers-handling-statistics-ctg-port/> accessed 15 July 2016.

9. Paul Krugman on New Trade Theory, *Journal of International Economics*, 1979; and New Economic Geography, *Journal of Political Economy*, 1991

10. *Railway Reform: Toolkit for Improving Rail Sector Performance*, p 2.

11. According to the US DOT, rail averages about 426 ton-miles/gallon (165 tkm/l); road transport about 155 ton-miles/gallon (60.3 tkm/l).

Environmental and Land Use Benefits

Modern railways are a green transport alternative when their infrastructure and trains are heavily utilized. In general, they are more energy efficient, have lower environmental impacts on water and air, and are less expensive to build than other transport modes. Modern and well run railways offer significant environmental, land-use, and capital investment benefits – they are usually more energy efficient than road transport and much more environmentally friendly because they have lower emissions per traffic unit (passenger/kilometre or ton/kilometre) than nearly any other mode.¹²

Railways generally also have a much smaller land requirement for right-of-way than highway. Rail right-of-way is also environmentally friendly as it is porous and railway lines have much smaller impact on water drainage and nearby waterways than road transport.¹³

Assessment of Current Situation and Opportunities

Physical Characteristics

Bangladesh Railway (BR) has a total of 2,877.10 route-km railway consisting of three different gauges. The MG (1000mm) and BG (1676mm) system has been in the country since the beginning but Dual Gauge (DG) – a mix of MG and BG system has been introduced since 2001. In Bangladesh era, a total of 138.89 route-km railway has been added as a new route, of which 103.70 km is DG and 35.19 km is MG line. On the other hand, a total of 228.74 route-km rail lines have been closed during Bangladesh era.¹⁴

Administratively, BR maintains two zones, the East Zone (EZ) and the West Zone (WZ). The total route length under EZ is 1390.78 km. Out of entire EZ network, only 119.45 km railway line of Dhaka-Chittagong route is double track, 124.80 km is being doubled, and BR has recently extended DG system from Joydevpur to Dhaka.¹⁵

The WZ is dominated by BG line. There is only 96.01 km double track BG line in the zone.

12. The World Bank, *Railway Reform: Toolkit for Improving Rail Sector Performance*, 2011. p 5

13. *Ibid* p 6

14. *Bangladesh Railway Master Plan*, p 8.

15. *Bangladesh Railway Information Book 2014*.

Passengers

As recorded in BR's Information Book 2015, during the last 45 years, the number of passengers carried by BR decreased by 53% in 2000, although population doubled. However, during the next period, passenger-kilometres increased.

Punctuality of Trains

Punctuality, train delays and cancellation are the three main issues of great concern to train users. All these three aspects of service are related to on-train running. The average punctuality rate over the entire system and all train type is about 60%, which is a matter of great concern.

Freight

The rail sector has been losing freight market share for many years due to a variety of problems, which are related to poor management, low investment and lack of maintenance of infrastructure; leading to poor service to customers. Rail share of transport has fallen from 30% to 7% over the last 30 years, but with the exception of container traffic, which is increasing at around 9.2% per year.

Limitations of BR's Rolling Stocks

Bangladesh Railway wagons carry a maximum load of 40 tonnes, and trains can operate with no more than 30 bogie wagons. Average freight train speed is however about 23 km/hour, which is very low in comparison with other Asian countries. In Bangladesh freight traffic is still handled manually in the traditional manner.

Compatibility of Standards with Neighbouring Countries

The Southern corridor of the Trans-Asian Railway (TAR) from the East passes through Myanmar, India, Bangladesh and again India and then Pakistan, Iran and Turkey before it joins the European Railway. The entire South-East Asia is having MG Railway from Malaysia, all the way up to India border point with Myanmar at Tamu. Bangladesh has mostly MG on the Eastern side of Jamuna River and BG on the Western side. Indian Railway mostly has BG, and the existing MG sections are being converted to BG.

TAR network in entire South-East Asia is MG, and there is no plan for their conversion, except a small section between China and Vietnam. The MG network in India has almost been converted to BG. As such to facilitate direct movement between Bangladesh and North-Eastern part of India, as well as with Pakistan and Nepal, the relevant regional routes need to be compatible as regards to:

- Railway track gauge,
- Structure gauge
- Axle load standards.

Railway Network

BR network was inherited from British Indian railways with two-different gauges; MG and BG in two zones. With the railway link over Jamuna, the east-west railway system has been interconnected using a DG configuration. The reorientation of the railway network and rationalisation of gauges are yet to be accomplished.

The present network is disorganized. The main Dhaka-Chittagong corridor is circuitous and lacks double track. Barisal division as well as hill districts of Chittagong and Cox's Bazar are devoid of any rail network. The links which will make the network more compatible to Bangladesh's needs are:

- Khulna – Mongla: to connect Mongla Port
- Dohazari – Cox's Bazar: to connect future Deep Sea Port
- Narayangang – Laksam: to make Dhaka-Chittagong corridor straight
- Jessore – Dhaka: to shorten distance from south western part of the country and improve TAR connectivity.

The rail connectivity in Barisal division demands due considerations in light of the upcoming Payra Port. Connectivity of the hill districts require much steeper gradient and therefore will be much more circuitous thus not reaping the benefit of railway economically.

Opportunities for Bangladesh Railway

In order to determine the areas where BR should focus its attention an analysis was made of the potential areas where it could provide competitive services. From this analysis, it is clear that BR shall have to focus on inter-city passengers, long haul freight traffic along certain corridors, and container traffic.

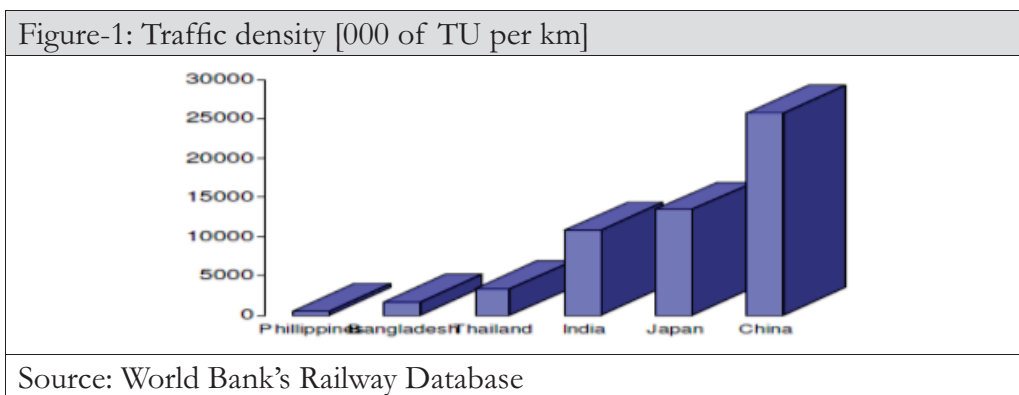
Table-1: Bangladesh Railway Potentials			
Sector/ Business	Potential	Constraints	Opportunities
Containers	<ul style="list-style-type: none"> • Massive growth Through Chittagong • Ideal for rail transport • Rail only carrying 10% of market, but potential exists to carry higher share 	<ul style="list-style-type: none"> • Capacity of Dhaka ICD almost reached • Line capacity on Dhaka-Bhairab, and Lakhsam-Chinkiastan limits container trains to 2 per day each way • Distance relatively short compared to international standards • No rail connection to Mongla port 	<ul style="list-style-type: none"> • New ICD at Dhirasram could increase capacity • Tongi-Bhairab dual track; and Lakhsam-Chinkiastan dual track will open up opportunities • Railway can take up to 25% of market • Could remove 500 trucks (carrying container goods) per day from roads • New ICD in North-West Bangladesh could be set up
Other Freight	<ul style="list-style-type: none"> • Petroleum products • Stone/sand non-perishables • Food grain • Fertiliser 	<ul style="list-style-type: none"> • Relatively short haul distances • Lack of infrastructure facilities at transfer points • Poor marketing initiative to capture traffic 	<ul style="list-style-type: none"> • Improved handling • Competitive tariffs • Removal of trucks from road

Table-1: Bangladesh Railway Potentials			
Sector/ Business	Potential	Constraints	Opportunities
Inter-city services	<ul style="list-style-type: none"> Longer distance travel suited to railway (average trip length on main corridors 173 km) Higher value of time (Tk 29 per hour) than average rail passenger (Tk 24) 	<ul style="list-style-type: none"> Relatively low value of time, so may not pay much more for faster service Poor quality rolling stock 	<ul style="list-style-type: none"> Long trip lengths provide opportunities to capture high end market Current low use of AC and 1st class seats, could be increased
Source: BR Master Plan 2013			

Analysis of Problems

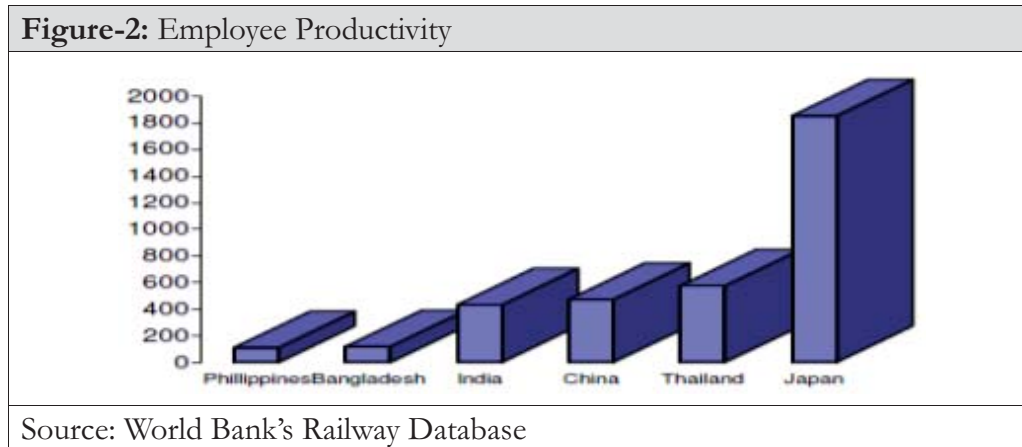
Track Conditions

Track maintenance at adequate standard is a fundamental requirement of permanent way (P-way) to avoid derailments and provide acceptable riding quality. BR needs to make adequate arrangement for maintenance to ensure safety and adequate riding quality. Maintenance of track mainly suffers due to inadequate allocation of resources. As a result, very often speed restriction is imposed to ensure safety. The performance of P-way is generally measured by traffic density. The bar chart shows that utilisation of track in Bangladesh.



Employee Productivity in Maintenance

Employee productivity, related to track maintenance is one of the crucial issues which need to be maintained for ensuring proper utilisation of public fund. The bar chart below related to employee productivity shows that it is very low in Bangladesh.



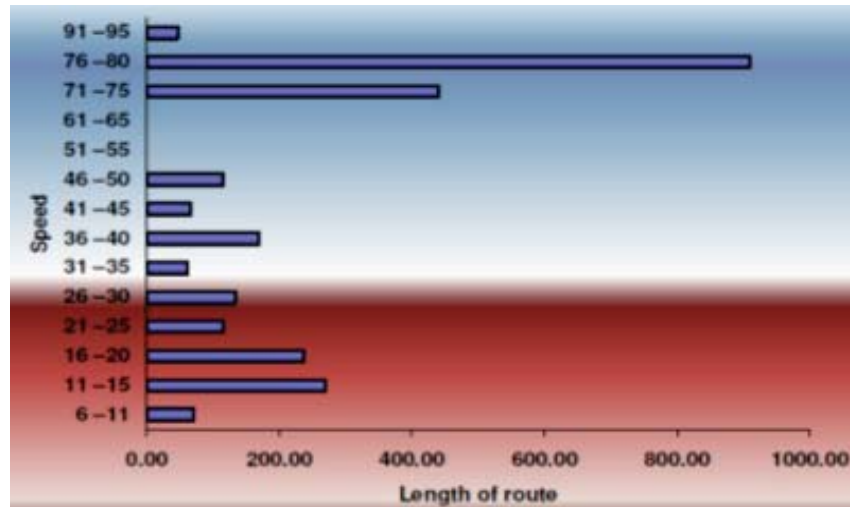
Bridge Conditions

Most of the railway bridges were built more than 100 years ago and the permitted speed on most of them is limited to 30-50 km/hr thus acting as bottlenecks. According to BR, the bridges need to be replaced or rehabilitated because of damage of abutment, pier, and girder, and crack and or corrosion of steel structures. In addition, some of the bridges need to be replaced because of double tracking programme. There are 546 major bridges, having lengths more than 40 metres. The numbers of minor bridges are 3,104 which are mainly arch, rail cluster, RCC slab, Hume pipe etc.

Speed Restrictions

In Bangladesh Railway, there are two broader groups of speed restriction, which are 11-50 and 51>. The following bar chart describes the speed limit with imposed restrictions. A staggering 47% of the network has speed restrictions of less than 50kph. WB recommended desirable speed range is 60 - 100 kph. This is severely hindering desirable operational performance.

Figure-3: Speed Restriction vs Track Length



Source: BR Working Time Table No 39 and GIS Database, TSMR, TSC Wing, Planning Commission

Operational Capacities

BR is responsible both for railways infrastructure and train operation. The infrastructures include development and maintenance of track, bridge, ferry service, signalling, telecommunication system, and other civil engineering assets. The operation includes procurement and maintenance of rolling stock, operating performance and line capacity requirements. As such for efficient operation of the railway, coordinated management decisions in respect of all BR's assets, fixed as well as rolling stocks, is essential. Availability of well-maintained fixed assets are pre-requisite for punctual operation of rolling stocks. On the other hand, the quality, quantity and standard of maintenance of rolling stocks is equally important to maintain punctuality. However, the attractiveness of a train service depends on a number of factors, which include timing the train at origin and destination points, speed, frequency of services, cleanliness of coaches, and ticketing system.¹⁶

Safety

The categories of train accidents are divided into collision, derailment, fire in the train and train running into obstruction. Table below depicts further details.

16. Railway Master Plan, 2013, p. 27.

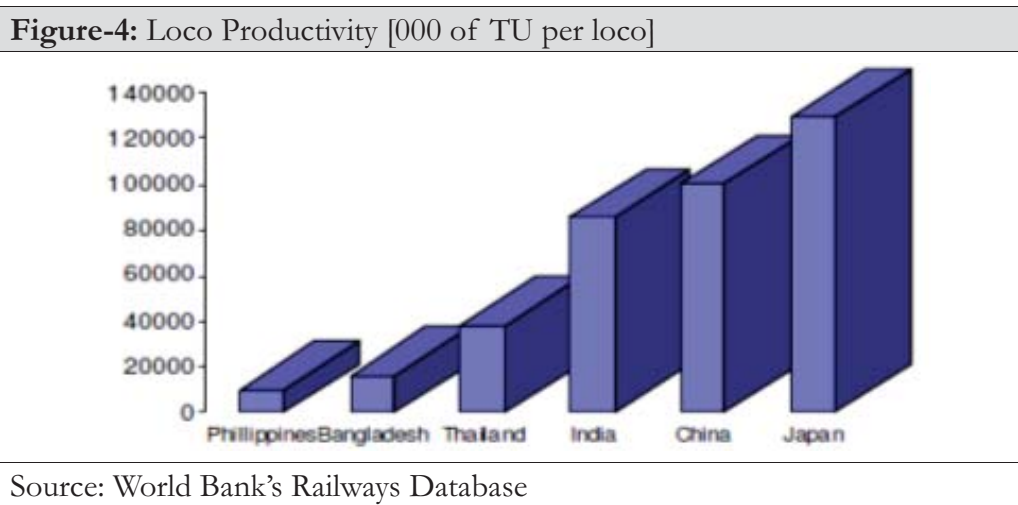
Table-2: Train Accidents by Category

Year	Colli-sions	Derail-ments	Fire in trains	Train running into obstructions	Total	Cost 000 tk
2005-06	3	790	-	37	830	47,37
2009-10	2	403	-	34	439	-
2010-11	1	392	-	18	411	145,05
2012-13	3	133	-	15	151	6,330
2013-14	1	158	-	18	177	1,928
2014-15	-	292	-	20	312	3,45

Source: Information Book of Bangladesh Railway, 2015

Locomotives

Locomotives are expensive items; as such it is only through increased productivity that the unit cost of a loco could be reduced. It is argued that a well-managed railway should have above 90% of its diesel locomotive fleet available for use on any given day. In Bangladesh availability of MG locos is about 85%, and 75% for BG locos.



MG and BG Coaches and Wagons

The carriage fleet (passenger coaches) is the second area of critical importance in the context of providing railway services. About 26% coaches of MG lines are over 30 years old and another 24% coaches are approaching that age. For

BG line, 24% coaches are already over 30 years old and another 54% coaches are within the age range of 26-30 years. Moreover, maintenance of coaches is another important factor which contributes to productivity.

The availability of MG wagon for use is 84% and in case of BG wagon, it is only 71%. It was found from the available data that there are significant numbers of extremely old wagons in BR freight fleet.

Workshops and Locomotive Shed

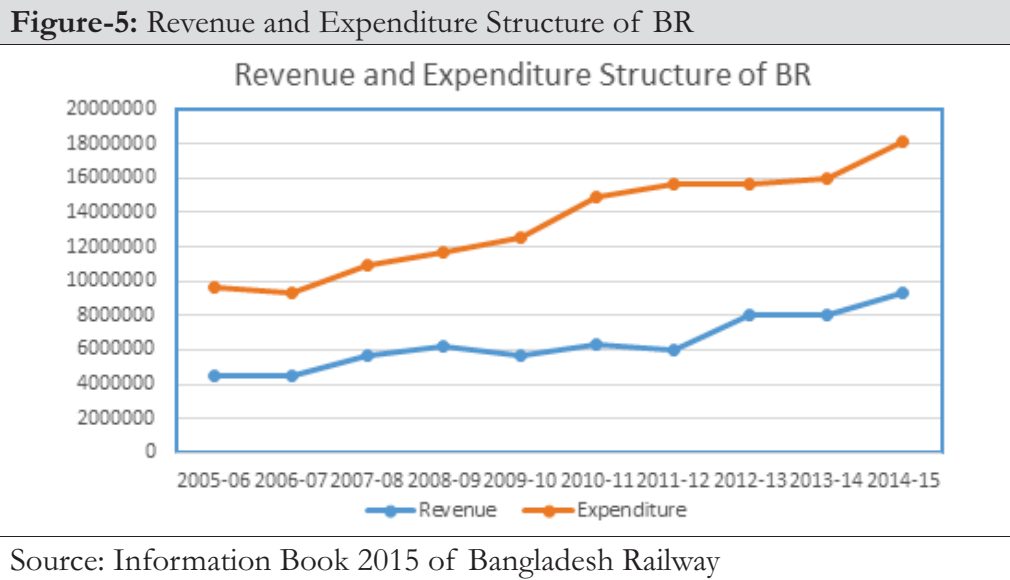
BR owns workshops for maintenance of its rolling stocks. The workshops are based in Dhaka, Pahartali, Parbatipur and Saidpur. Saidpur Railway Workshops is the largest workshop of BR, which is well equipped for undertaking heavy repairs of carriages and wagons of both the gauges. Heavy repairs and major overhauling works for MG and BG locomotives are carried out at Parbatipur. In all the workshops and loco shed the infrastructure is in dilapidated state and needs urgent renovation.

Civil Engineering Shops & Plants

There are Bridge Workshops situated at Kadamtali and Saidpur need modernization. The Bridge Engineering shop & concrete yard at Kadamtali may be converted to a modern Track Machine Shop where mechanized track maintenance machineries could be maintained & operated. Other production works related maintenance to Track & Bridge may also be performed in the shop. Modernization of Saidpur Bridge Workshop is essential. Bangladesh Railway has a training academy at Haliashahar which needs to be rehabilitated and training facilities and modules have to be improved.

Financial Position

Financial positions of Bangladesh Railway are dependent on a mix of overall financial performance, fare and tariff structures. Partly, due to its declining market share, increasing costs and regulated tariffs, Bangladesh Railway has been running at an increasing deficit.



Synopsis of Problems and its Consequences

Most of the existing problems faced by BR are a result of the lack proper maintenance of BR’s permanent ways, bridges, signals and other ancillary facilities over a number of decades. As a consequence, weight restrictions, speed limit, safety issues have become matter of great concern for train operations. Though different types of works relating to rolling stocks are undertaken in various workshops, these workshops themselves had not been maintained or overhauled over the years to get the maximum productivity. Aging rolling stocks together with lack of maintenance on a timely manner, decreases the availability of rolling stock. In addition, employee productivity, relating to infrastructure maintenance and train operation in BR is low compared to other Asian countries. The net result is that BR has been a losing concern for many years.

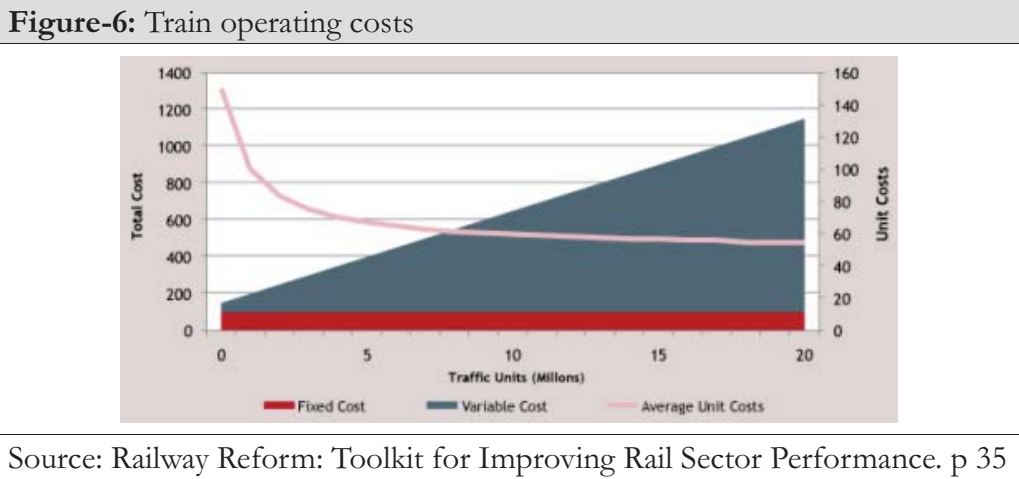
Railway Economics

Economic Features of Railways

Railways are unique in that the same entity often provides both railway services and network infrastructure. For all modes of transport, neither infrastructure nor service capacity can be stored—the unused train path, aircraft take-off slot, or shipping berth is lost. Similarly, when trains, ships, aircraft, or trucks travel with only partial loads, the unused capacity is lost. Therefore, higher vehicle

productivity is crucial to better commercial performance for transport service providers, just as higher infrastructure utilization is crucial to better commercial performance for the infrastructure provider.¹⁷

Numerous economic studies show that railways exhibit economies of density—their long-run average cost curve slopes downward. Unit costs decline as output rises on the railway line as the fixed cost of providing track is spread over more traffic units.¹⁸



Railway Pricing

In practice, there is no prescribed or standard form of market based pricing for railways. Good railway managements adapt pricing practices to their markets, customers, institutional arrangements, pricing regulations, and the social and economic norms in which they operate.

Financial Sustainability for Railways

A railway achieves financial sustainability when it has sufficient longer-term financial resources to cover operational costs, to invest, and to meet debt service and other financing requirements.¹⁹

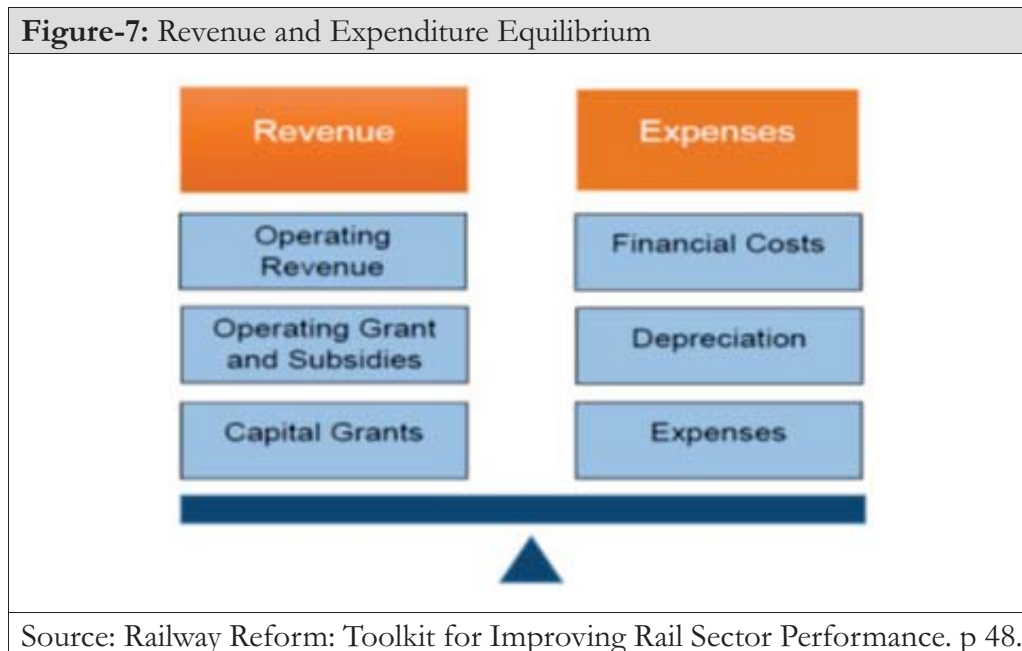
17. For ocean shipping, the route ‘network’ is free and has vast capacity, but infrastructure utilization is still critical to performance for port providers.

18. Railway Reform: Toolkit for Improving Rail Sector Performance, p.34

19. Railway Reform: Toolkit for Rail Sector Performance, 2011, p.48

Policy choices affecting financial sustainability

Financial sustainability depends on multiple factors-some internal, some external to the railways. As a result, there is no single set of general rules that would guarantee overall financial sustainability. A general revenue and expenses equilibrium can be conceptualized as shown below:



Some factors that affect financial sustainability are market-specific but often government policies also influence the situation.

Drivers of Financial Sustainability

The four main elements of railway financial sustainability are revenue structure, cost structure, investment requirements, and capital structure.

Revenue structure

The important components of revenue structure are traffic, pricing, revenue collection, subsidies and service payments.

Traffic

Railways can influence over their share of transport demand, and traffic volume they carry. If the railway provides timely, reliable, high value service, the railway can increase its market share. For example, BR improved their services for transporting containers by establishing ICT.

Tariff/Pricing

A second component of railway revenue is pricing, which is governed by three main factors—costs, competition, and regulation. Often, the railway must attempt to manage all three because prices need to cover costs, but revenues may be limited by both the regulator and the market. Railways should price to maximize the contributions of the traffic. This requires the railway to understand how to price its services competitively—low enough to retain customers but high enough to maximize revenues. Also, the railway must understand demand elasticity to know when lowering the price will yield more revenues because traffic volume will increase more than price decreased.

Revenue collection

Prices established, services provided, the railway must then collect payments. This is not always straightforward, because sometimes clients stop paying. The railway should monitor revenue collection and withhold services from clients that are in arrears. One of the sore point for BR is the without ticket passengers which not only increases loss but lowers the image.²⁰

Government subsidies/service payments

Governments compensate railways for providing socially important but commercially unprofitable railway services. Revenue analysis should include these important sources of revenue, their payment structure, and any associated risks and variability.

20. Discussion with Syed Zahurul Islam, Director Traffic and Director PR, Bangladesh Railway, on 27 June 2016.

Investment

Railways are capital intensive businesses. This means that, in most years, a high portion of the railway's cash flow should be spent on investment. Financing activities (borrowing and raising capital) allow the railway to invest more than its annual cash flow during years that big investments are needed.

Railways can function for years without investment, but costs rise for materials and maintenance, and service quality and asset values decline. A railway that is not regularly investing, however, is "eating" its assets. Over long term, the railway becomes unsustainable.

Analysis

Accumulating the points from previous chapters and guidelines provided in the rail economic principles the following picture become evident:

- BR needs to maximise operation to minimise cost.
- Inadequate maintenance of infrastructure in turn reduces rolling stock productivity.
- BR's Civil Engineering Shops and Plants need modernisation to cope with the maintenance requirement of its infrastructure.
- BR's network is disorganised, at places circuitous and lack double lines on important routes.
- Most importantly BR must ensure investment on regular basis for proper maintenance of its assets which in turn will assure better performance.

Recommendations

Recommendations are made on four categories of strengthening present assets, reap benefit from rising opportunities, improving service and financial solvency.

- To realise the potential of present assets of BR regular investment should be made to:
 - Increase capacity of tracks through adequate maintenance.
 - Repair/replace bridges for higher speed and weight restrictions to eliminate network bottleneck.
 - Upgradation and Modernization of workshops, civil engineering shops/plants and training academy to raise efficiency of maintenance works.

- Replacement of tracks and rolling stocks on regular basis to maintain higher levels of availability.
- To benefit from the rising opportunities, BR may take up specific projects to augment their capabilities:
 - Establish missing links to make the network less circuitous and economically more viable
 - Standardize track gauge, axle load and structural dimensions to ensure smooth transition of TAR traffic.
- To improve service BR may take the following steps to attract clients/customers:
 - New ICT or expansion of present one with customs and handling facilities.
 - Increase station facilities to accommodate larger trains with higher capacity with sufficient amenities.
 - Adjust timing and frequency of passenger trains to meet demand with easier ticketing system.
- To help BR become more financially sound following recommendations are made:
 - BR should price their services on commercial basis, particularly for freight traffic and high end passenger market.
 - Efforts should be made to realise revenue and reduce without ticket passengers.

Conclusion

Bangladesh Railway once a profit making enterprise gradually lost its market share and turned into a burden for the government. World over railways provide cheaper, safer, and environmentally less offensive transportation when utilised optimally. Generally railways have a much smaller land requirement for right of way than highways. This is a vital benefit for a land scarce country like Bangladesh. While it has the potential to be more effective, efficient and people centric, BR suffers from certain setbacks which are legacies of the pre-independence period and subsequent negligence thereafter.

BR is responsible for both infrastructure and operation. As such for efficient operation of the railway, coordinated management decisions in respect of all BR assets, fixed as well as rolling stocks, is essential. BR inherited a network which comprised of two different zones segregated by River Jamuna having two different gauges. Through BMB, BR could connect the zones but speed and weight restrictions over the bridge is a matter of concern. Another matter of concern for the clients of BR is the punctuality of trains. This is affected by the track condition, condition of bridges, availability of rolling stocks and their maintenance, speed restrictions imposed for safety amongst many other factors.

The changing market and geostrategic location has opened up opportunities for BR. Growing container market demands rail facilities to adapt accordingly. Making the Dhaka-Chittagong route double track will ease the burden on road at the same time save expenditure from cost of fuel, reduce accidents and increase productivity. As a corollary inclusion of services to Mongla port, Payra port and the upcoming deep sea port at Cox's bazar will see a quantum leap in our economic progress. On the other hand in the southern route of TAR Bangladesh can play a pivotal role as the confluence of MG and BG lines and become a regional hub of rail connectivity.

Overall performance of BR leaves much to be desired in all aspects of personnel efficiency, Infrastructure capabilities and Rolling stock productivity. However, for all three aspects lack of investment is identified as a common cause. BR has a huge potential but it has been left neglected for a long time. The government has recently taken steps to bring BR out of this sorry state and turn it into a vehicle for the economic emancipation of the country.

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