

Exploring the Most Efficient Transportation Mode for Cement Industries: A Case Study from Bangladesh Perspective

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Abstract

Cement industry of Bangladesh is the 40th largest cement market in the world. The current capacity of the cement industry of Bangladesh is about 20 mn tons (MT) per year. The top 13 players of the market control over 78% of the total industry capacity. The major players in this industry are Shah, Lafarge Surma, Holcim, Cemex, Heidelberg, Premier, Akij, and Scan cement. This paper reviews that considering all factors, river transportation is the most efficient distribution channel for cement industry in Bangladesh.

Keywords: Supply chain management, transportation, river transportation, cement industry.

Introduction

Transportation entails moving inventory from point to point in the supply chain, and this can take the form of many combinations of modes and routes [1]. Transportation choices have a large impact on supply chain responsiveness and efficiency [2]. Cement, being a bulk commodity, is also a freight intensive industry and transporting it over long distances can prove to be uneconomical. It is seasonal in nature because during monsoon season industry suffers from low demand. Four major cost elements associated with the supply chain of cement industry as percentage of sales are:

Cost Elements	% of Cost of Sales
Power and Fuel Costs	10%
Raw Material Costs	75%
Transportation Costs	5%
Other Expenses	10%
Total	100%

Methodology

The primary method of data collection is face to face oral interview of logistics managers of top 10 cement companies in Bangladesh. This research is mostly conducted based on their interview data. The secondary method of data collection is books, journal, articles, and website of relevant field.

Cost-Benefit Analysis

Transportation is one of the key drivers of supply chain [2, 3]. The cement industry strives to keep the transportation cost low because the other heads of cost elements eat up maximum amount of supply chain funds. That's why most of the time companies adopt low cost transportation mode to carry cement products even compromising with increased lead time. In Bangladesh, there are three types of transportation modes- road, river, and rail [5]. Both road and river modes are widely used in cement industry. To make a comparison among the transportation modes, it is needed to consider the cost structures of various modes in cement industry. Cement carrying cost structure is as follows:

Modes	Rates
Road	BDT. 0.15 /bag /km
River	BDT. 0.05 /bag /km
Rail	BDT. 0.075 /bag /km

As transportation cost is a vital cost parameter in cement industry, most of the companies pay attention on low cost distribution model trading off between river and road transportation. The cost to transport the cement to its distribution terminals along with location of a cement plant determines the plant's competitive position and price which it may charge. Though probable cement transportation cost by rail seems to be lowest, manufacturers don't get opportunity to transport by it because of poor infrastructure and bureaucratic red-tapes. In this situation, river transportation appears to be the most feasible and advantageous one in terms of cost and quantity. By river, a bag of cement costs BDT. 0.05 per km. Depending on the different distances, cost of transporting cement through river route varies from BDT. 250 - 650. To realize the benefits of low cost river transportation, cement

manufacturing plants and distribution hubs are located on or near to the river banks, prominently river Buriganga, Shitalakkha, Meghna, etc [5].

One of the biggest advantages of river transport over road transport is the quantity that can be transported. By road, a truck can transport at best 35 MT of cement whereas by water way a barge can transport as much as 1,500 MT. Cement is carried by two types of water vehicles- barge and bulkheads (developed locally). Most companies depend on outsourced transporter to avoid high involvement and coordination cost. As river mode is most efficient way of transportation for cement industry, most of the companies use this mode as low cost distribution channel. One reason behind the wide adoption of river route is that almost 80% cement manufacturing plant and distribution points are located on Shitalakkha, Meghna, and Buriganga river banks surrounding Dhaka and Narayanganj cities, as Dhaka is the most growing market for cement. Though river transport is less responsive, industry players and distributors compromise high responsiveness to efficiency because of the cost that the company incurs for using more responsive mode of transport which will also reduce the supply chain surplus by charging end customers higher. To leverage the benefits of low cost, almost 100% inbound transportation of cement industry depends on river transport. Comparing to rail, truck, and water, shallow-draft water transportation has been proven to be the most energy efficient and cost efficient method of freight transportation for moving bulk raw materials of all kinds, like cement products.

Routes

The length of inland river channels in Bangladesh is around 24,000 km. But in monsoon, the length of navigable waterways is 5,968 km whereas in dry season it drops to only 3,865 km [5]. The river routes in terms of loading and unloading points in this country fall into four classes mainly:

- Class I routes include the main arteries of traffic flow connecting the five principal river ports, viz. Dhaka, Narayanganj, Chandpur, Barisal, and Khulna as well as connecting them with the sea ports of Chittagong and Mongla. The more important routes in this category are (i) Narayanganj-Chittagong via Chandpur; (ii) Narayanganj-Mongla via Chandpur, Barisal and the Sundarban channels; and (iii) Mongla-Khulna.
- Class II routes are secondary routes which provide links between the principal river ports and the secondary river front centers. Some of the notable routes in this category are (i) Chandpur- Goalundo; (ii) Chandpur-Barisal; and (iii) Narayanganj/Dhaka-Chhatak (in Sylhet) via Bhairab Bazar.
- Class III routes are IWT links of regional importance connecting the smaller commercial centers like Patuakhali, Bagerhat, Kushtia, Jhalakati, Chilmari, Chandraghona, and other places. Class IV routes are also often recognized for such routes which are entirely seasonal and serve as feeder routes to the other three classes of routes.

Cement products are transported by river across the country through some hubs. These are prominently Narshingdi, Noapara, Chittagong, Mongla, Baghabari, Bhoirab, Ashuganj, Narayanganj, Meghna-ghat, Munshiganj, etc. To reach cements to the hubs, the routes of class I, II are mainly used by the cement companies.

Opportunities

River is the most favorable and feasible way for transporting cement products [4]. River transportation is almost sound pollution free if compared with road. Cement products can be transported to longer distances with less fuel consumption by river than by road and railways. On an average 1 MT of cement can be transported up to 59 miles per gallon of fuel by truck whereas 1 MT can be transported up to 202 miles per gallon of fuel by road and surprisingly a barge can transport the same quantity of cement up to 514 miles by the same quantity of fuel by river. That's why carbon emission tends to be reduced by river transport. Another big advantage is low accident rate in river transport (which is less than 1% per year). As the accident rate is low, the loss of goods is not significant. Water ecology is also not negatively affected by cement transport through river. Infrastructural cost of river transport is not also very high compared to rail and road. Above all, for international trades, water is the most popular, convenient, and cost effective way of transport in terms of overall efficiency, quantity, and safety.

Challenges

Apart from the opportunities and advantages, cement transportation by river faces some challenges from which a considerable number of opportunities can be realized. It is found in many investigations that cement industry mostly faces four major challenges while doing river transportation. Firstly, navigability is not up to the requirement. That's why in dry season companies transport cement by bulkheads that carry the quantity ranging from 400 - 600 MT only for shallow navigability whereas a barge can carry upto 1500 MT in navigable waterways. In rainy season 70% of cement products are transported by barge and 30% of those are transported by bulkheads. On the other hand, in dry season, 70% of cement products are transported by bulkheads and only 30% of those are transported by barge. This increased amount of cement transportation by bulkheads in dry

season increases the total river transportation cost of the manufacturer. During night-time transporters cannot operate water vehicle because of nonexistence of proper night navigation system in the river routes. Secondly, because of unavailability of shading facility, cement loading and unloading faces difficulties during rain time which results in soaking and wet cement bags during the process. Thirdly, overall infrastructure in the distribution hubs are not facilitating for quick loading and unloading of cement. Finally, the overall law and order situation in the rivers are not satisfactory. Sometimes the transporters are attacked by the robbers and pirates in rivers where killings and robbery take place.

Recommendations

- To increase navigability, a considerable attention is required from the government. To finance the dredging of the rivers, Bangladesh Inland Water Transport Authority (BIWTA) can join hands with cement companies who are willing to help for the betterment of the industry.
- Waterways need to be enough navigable during night time so that big barges can run with cement products all through the year, be it dry or rainy season. To reduce the huge lead time eaten up by river transportation, a night navigation system needs to be introduced at least through the critical points initially by the BIWTA.
- The cement companies should be allowed to jointly build shading facility to ease up their loading and unloading activities in land stations. This way they can load and unload their products without hassle during rainy season as well.
- GPS can be used in barges and bulkheads in order to locate the barge because it will reduce pilferage, maximize trip utilization, provide real time data on different matters including speed of vehicles, and will also enhance the security concern of the trip by providing real time position to the law and order enforcers to prevent robbery or attacks.
- Last but not the least, to decrease the river transportation cost, the transporters need to adopt “reverse logistics” while transporting cement products. Thus, the transporter can fill their barges and bulkheads with concrete or sands or other bulk commodities when coming back from the destination location. This will reduce the cement transportation costs.

Conclusion

Those who are agile and challenge taking can find opportunities from the challenges. Though cement transportation is facing a number of problems, a joint endeavor of cement companies and the Government of Bangladesh can create a way forward to develop a strong supply chain leaving the problems behind in the pursuit of excellence in river transportation, and thus contribute positively behind the growth of national economy.

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