

# **Exploring cost reduction approaches and associated challenges towards value for money for the Bangladesh Railway**

A Dissertation

By

Md. Rezaul Karim, MPSM- Batch 12

Student ID-16382026

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**BRAC Institute of Governance and Development,  
BRAC University**

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Md. Rezaul Karim, MPSM- Batch 12

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Supervised by

Dr. Niaz Ahmed Khan

Professor and former Chairman

Department of Development Studies

University of Dhaka

& Senior Academic Adviser, BIGD, BRAC University



**BRAC Institute of Governance and Development,  
BRAC University**

Dedicated  
To  
The people of Bangladesh

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Md. Rezaul Karim

Student ID-16382026

MPSM- Batch 12

BRAC Institute of Governance and Development (BIGD)

BRAC University, Dhaka

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Md. Rezaul Karim

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## Abstract

Bangladesh Railway is the state-owned rail transport agency of Bangladesh. It operates and maintains the entire railway network of the country. BR is controlled by the Directorate General of Bangladesh Railway under the Ministry of Railway. The vision of BR is to provide safe, reliable, cost-effective, and time-efficient rail transport service in the country through modernizing, expanding, & maintaining rail system in a manner which supports government strategies for economic, social, & environmental development.

Transportation sector in general and Bangladesh Railway (BR) in particular, has always played a vital role in the economic growth and development of Bangladesh by hauling both goods and passengers. However, BR has been facing formidable challenges from alternative modes of transport during the past decades. BR is losing its share, both in absolute and relative terms, to a fast growing road sector. This loss of share can largely be attributed to a well planned and well developed road network that began expanding since the eighties.

The road transportation is mostly privately managed and is more efficiently operated relative to BR. The latter has been a publicly funded and managed organization. Railway is known to have competitive advantage in bulk goods and long haul due to cost effectiveness and safety issues. However, BR has failed to meet the standards due to institutional shortcomings and physical bottlenecks. Today BR is in frail health with obvious symptoms of further decline in its performance. An in-depth academic investigation to identify some weaknesses of can help formulate appropriate policy measures for improvement of the sector. Besides providing transportation services, railway is also a major employer of civilian labor force. The current level of employment in this sector exceeds 40,000 employees. BR should be capable of providing optimal services and help economic growth by ensuring a smooth flow of goods, e.g., food, raw material, industrial and agricultural inputs, exports etc. With its net operating income in the red, the problems seem to demand a higher degree of attention, as the sector continues to claim a larger share on the limited resources. The Railway receives a sizeable subsidy from the public exchequer, despite the well-documented evidence that subsidy promotes inefficiency. The onus must be on the railway to play a socially desirable role. From policy considerations, it is important that the sector runs efficiently, remains economically viable, and makes significant contribution to growth of the economy. From that perspective, research on the performance of this sector, is long overdue. One way of

improving efficiency and ensuring value of public money is to reduce the operating cost. This research is an effort to explore the cost reduction approaches and opportunities in Bangladesh Railway, in the light of procurement and supply chain management.

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## Abbreviation

ATM	: Automated Teller Machine
BG	: Broad Gauge
BOM	: Bill of Materials
BR	: Bangladesh Railway
BRA	: Bangladesh Railway Authority
CIPS	: Chartered Institute of Procurement & Supply
DPHE	: Department of Public Health Engineering
ERP	: Enterprise Resource Planning
FAST	: Functional Analysis System Technique
GIBR	: Government Inspector of Bangladesh Railway
HR	: Human Resource
ICT	: Information & Communication Technology
IT	: Information Technology
ISO	: International Standardization Organization
JIT	: Just in Time
KPI	: Key Performance Indicator
MG	: Meter Gauge
MRP	: Materials Requirements Planning
MPS	: Master Production Schedule
MRO	: Maintenance, Repair and Operating
NAO	: National Audit Office

OGC	: Office of Government Commerce
OEM	: Original Equipment Manufacturer
PSO	: Public Service Obligation
PWD	: Public Works Department
QC	: Quality Control
QA	: Quality Assurance
RFID	: Radio Frequency Identification
RDC	: Regional Distribution centre
R&D	: Research and Development
RHD	: Roads and Highways Department
SBU	: Strategic Business Unit
SRO	: Statutory Regulatory Order
TCO	: Total Cost of Ownership
TAC	: Total acquisition cost
TQM	: Total Quality Management
TK	: Taka
UK	: United Kingdom
VA	: Value Analysis
VFM	: Value for Money



## **Chapter 1: Introduction and the context**

### **1.1 Introduction**

Bangladesh Railway is one of the oldest and historical organizations in this subcontinent. Railway's operation in the present geopolitical boundary of Bangladesh dates back to 15th November 1862, when a Broad Gauge (BG) single line was constructed and opened to traffic between Darsana and Jagoti near Kushtia [1]. In the British India railway system, there was considerable expansion of railway network in this territory under the State and various Companies. The Meter Gauge (MG) network on the eastern side was mainly constructed to connect Chittagong Port with Assam and on the western side the network was Kolkata bound BG running down from the north. These two types of network remained isolated by the river Jamuna since the opening of Jamuna Multipurpose Bridge. Bangladesh Railway, is made up of truncated portions of the erstwhile East Bengal Railway and Bengal Assam Railway (of the then British-Indian rail system), which after 1971 War of Liberation fell in Bangladesh territory, inherited a number of structural and physical weaknesses as a part of its legacy, since it was not specially designed and constructed to serve Bangladesh. At present BR covers a length of 2877.10 route kilometers linking the entire length and breadth of the country [2].

The management and development of railway was vested with a Railway Board, comprising of a Chairman and four members after independence, till June 2, 1982. But, for administrative convenience and operational reason, the Railway Board was abolished with effect from June 3, 1982 and the function of the Railway Board was vested with the Railway Division of the Ministry of Communications with the Secretary of the Division working as the Director General of Bangladesh Railway. For the same purpose the Railway bifurcated into two zones, East & West, under the administrative control of two general managers, who are accountable to the Director General of Bangladesh Railway. Subsequently on August 12, 1995 the day to day operation of the Railway was separated from the Ministry and entrusted with director general drawn from the Railway professionals. For policy guidance, a 9 (nine) member Bangladesh Railway Authority (BRA) was formed with the Minister Ministry of Communications as its Chairman [2]. In December 2011 Ministry of Railways formed by the Honorable Prime Minister under SRO-361 Rules of Business 1996 Rule-3. The Director General is assisted by Additional Director General and Joint Director General to perform all

administrative and policy making jobs. The General Managers of the two zones are assisted by various specialized departments who are responsible for operation, maintenance and financial management. Each zone is again divided in two divisions, which are the basic unit of operation. The four divisions are Dhaka, Chittagong (East zone) and Paksey, Lalmonirhat (West zone). The division is headed by a Divisional Railway Manager, who is assisted by Divisional Officers of various specialized Departments such as Personnel, Transportation, Commercial, Finance, Mechanical, Way and Works Signaling & Telecommunication, Electrical, Medical, Railway, Nirapatta Bahini etc. Besides there are two workshop Divisions, one in each zone, located at Pahartali and Saidpur, each being headed by a Divisional Superintendent. Further there is a locomotive workshop headed by Chief Executive at Parbatipur for general overhauling of both BG & MG locomotives.

Bangladesh Railway has a Railway Training Academy headed by a Rector, a planning cell headed by a Chief Planning Officer, stores Department headed by a Chief Controller of Stores and Accounts Department headed by an Additional Director General/Finance for coordinating and advising Accounting and financial management activities of the two zones.

For ensuring safety of Railway transportation and the public Government has set up a separate Directorate under Ministry of Communications to inspect different works of BR relates with the train operation namely “the Government Inspector of Bangladesh Railway (GIBR)”.

The vision of BR is to provide safe, reliable, cost-effective, and time-efficient rail transport service in the country through modernizing, expanding & maintaining rail system in a manner which supports government strategies for economic, social & environmental development [2]. To support the vision, there are several missions of BR as follows [2]:

- Develop & maintain railway tracks & station infrastructures throughout the country.
- Maintain & upgrade locomotives, coaches & other rolling stocks.
- Maintain & modernize signaling & interlocking system & Telecom system of Bangladesh Railway.
- Ensure safe, speedy & efficient train operation.
- Implement Government transport policy in rail sector.
- Procure modern technology related rolling stocks, Track materials & signaling systems suitable for Bangladesh Railway.
- Manage land asset of Bangladesh Railway.

- Ensure optimum utilization of Development Budget & Revenue Budget of Bangladesh Railway.

BR is expected to serve both as a commercial enterprise and as a public utility service. As a commercial enterprise, BR has an obligation to generate sufficient revenue to meet its cost and as a public utility service it has a special responsibility to provide transport facilities to large number of passengers and movement of essential commodities for mass consumption. BR is also required to provide transport facilities in emergent situations like flood, cyclone, draught etc. In addition, the Railway has to bear some costs in the matter of education and medical care of railway employees and their wards, deployment of police forces in railway premises, etc. In discharging all these social obligations, BR has to bear certain cost burdens namely 'Social Cost'. Some important items of social cost are noted below:

- Carrying essential commodities and rendering transport facilities to passengers at lower prices than cost of services.
- Operation of un-economic branch lines.
- Carrying Relief Materials at concession rates.
- Carrying military traffic at less than normal tariff.

## **1.2 Problem statement**

Bangladesh Railway (BR), a principal transportation agency of the country, is a Government-owned and Government-managed unique organization, serving a population of approximately 160 million living in an area of 1,55,598 square kilometers. As railway is a very important mode of inland transport, its healthy growth naturally contributes to the economic development of the country. But BR, at present, has been suffering from various operating bottlenecks. Critical analysis of the efficiency of BR points up the worsening operating ratio over the last decades. Its continuing large deficit and the high level of direct and indirect Government subsidies is probably the single biggest issue forcing Government of Bangladesh in the transport sector. Since the liberation of Bangladesh, instead of constructing new rail-routes, some of the branch line railway sections were declared redundant and subsequently closed and no proper attention to maintain the existing asset was being given. Although huge development budget has been allocated for roads & highways sector, a little attention has been given to rail sector. Thus BR was forced to face the uneven competition with other modes of transport. Besides, one of the major problems presently faced by the BR is a serious

shortage of locomotives, carriages and route capacity. Lack of infrastructures, rolling stock, manpower and operational efficiency are the main problems of BR and all these are accounting high operational cost in result. So it is a challenge for BR to eliminate its inherited structural & physical weakness and to make it a profit-driven market-oriented commercial organization under public ownership and control.

BR is compensated under "Public Service Obligation (PSO)" system for operating specific services which are not commercially viable but socially necessary. This concept has been accepted by the Government, which are being reflected in the Revenue Budget since 1993-94. This replaced the open-ended subsidy and BR has been able to cover its operating expenses.

The main objective of a public sector organization is to provide service to the tax payers and achieve value for money of the tax payers. From table 1.1 we find the financial statement of Bangladesh Railway [3] for the last five years and it clearly shows that the net operating income is far less than the total operating expenditure.

	2008-09	2009-10	2010-11	2011-12	2012-13
<b>Total operating revenue (Without considering PSO &amp; Welfare grant)</b>	6253.53	5663.04	6295.46	6034.29	8042.63
<b>Total operating revenue (Considering PSO &amp; Welfare grant)</b>	7417.79	6731.62	7470.70	7264.25	9293.32
<b>Total operating expenses</b>	11727.49	11272.79	14918.19	15671.16	15623.81
<b>Net operating income (Without considering PSO &amp; Welfare grant)</b>	(-) 5473.96	(-) 5609.75	(-) 8622.74	(-) 9636.86	(-) 7581.19
<b>Net operating income (Considering PSO &amp; Welfare grant)</b>	(-) 4309.71	(-) 4541.17	(-) 7447.49	(-) 8406.91	(-) 6330.49

Table 1.1: Financial statement of Bangladesh Railway; Source: Information Book 2015, Bangladesh Railway

This means the government is subsidizing Bangladesh Railway in order to carry out its operational expenses and railway is by far from being a profitable organization. So, this research investigation tries to find out some approaches which might help BR to reduce its operating costs and increase operating income so thus the gap is reduced and value for money

of the public tax payer's is achieved. Also to find out the challenges of implementing cost reduction approaches in Bangladesh Railway.

### **1.3 Research questions**

The research questions developed after understanding the problem are:

- What are the approaches that can reduce cost of Bangladesh Railway?
- What are the challenges of implementing cost reduction approaches in Bangladesh Railway?

### **1.4 Research objectives**

The purpose or aim of this study will be to find the ways to improve efficiency of Bangladesh Railway by reducing cost. The specific objectives will be:

- To identify the present cost-profit scenario of Bangladesh railway
- To explore different cost reduction approaches and opportunities in terms of procurement and supply chain management
- To explore the associated challenges of implementing these cost reduction approaches
- To recommend ways for overcoming the challenges

### **1.5 Rationale of the study**

Bangladesh Railway, a principle transportation agency of the country, is a Government owned and Government managed organization. It covers a length of 2877.10 route kilometers employing a total of 25939 (June 2015) regular employees [2]. As a state owned organization, Bangladesh railway is mainly using the tax payer's money for its operation and other expenses. So there is an obligation of making sure that this public money is used properly and efficiently. One indicator is profit. But from the Bangladesh railway information book it is found that, railway operating expense is more than its revenue generation. As a result railway is making loss every financial year and subsidized by the government to run its operation. Railway is an organization of the British colonial period of around 170 years with different operation and departments, so there is lack of effective operating procedures, cost reduction methods and very old and out-dated operations still going on. This research study will try to find out these deficiencies and explore the cost reduction approaches. This is definitely help Bangladesh Railway to reduce its operating cost. Moreover, there are various ways of improving efficiency. Since the dissertation period is only of two months, for this short period of time, only a criterion of "cost" is selected to carry out the study so that it can be completed within the stipulated time. The research topic is based on Procurement and

Supply Chain Management and this is an ethical issue. No unethical task, intention and work will be carried out in this research study. Thus the research topic is selected in rational way.

### **1.6 Scope**

The scope of the study is limited to the issues relevant to the cost & efficiency of different operations of Bangladesh Railway. The report will focus only on the cost reduction approaches and challenges in context of Bangladesh Railway. It will try to find out the application of modern supply chain management's cost reduction approaches in Bangladesh Railway.

### **1.7 Research methodology: Nature of the study**

The study was explorative in nature and used qualitative and quantitative data. The main objective of the study was to explore the cost reduction approaches, its challenges and suggestions to overcome those challenges in Bangladesh Railway. The area of study was limited within different departments of Bangladesh Railway. The study was the reflection of guidance of course supervisor and organizational supervisors.

### **1.8 Sources of data**

Mainly two types of data were used in this study namely Primary and Secondary data.

#### **1.8.1 Primary data**

The questionnaire survey method was adopted for collecting primary data from different stakeholders of BR those who are working in Bangladesh Railway like senior officials, managers, workers, etc. as well as other professionals, retired officers and experts on Railway. Sample size was selected on the basis of convenience. Before asking for filling the questionnaire, the general idea of the research objectives were exchanged with them. After the exchange of general idea of the research objectives, the questionnaire was given to them. They were requested to fill the questionnaire based on the practical experience, perception & idea they had regarding cost reduction and achieving value for money in BR. Both open end and close end questions were set in the questionnaire to reveal the real perception of the respondents. These are all primary data. The questionnaires used in this study are given in the Appendix.

### **1.8.2 Secondary data**

The sources of secondary data were the analysis of Past studies and other existing data, text books, reference books, published journals, articles, railway manuals, BRASS, Railway information book, internet, etc.

### **1.9 Study area**

Bangladesh Railway is a large organization having 12 departments. So, it was very difficult to obtain data, information from all these departments. Due to time constraint and convenience of the present study some selected departments of BR were used for collection of data in the questionnaire. The number of respondents of the questionnaires was also limited as limited response and feedback were obtained for quantitative data.

### **1.10 Limitations of the study**

The study was completed within a very short time period. As a result the study focus area was not too extensive. The particular topic is a very vast one and it is very difficult to complete a research on this vast topic in a limited time period. As a result the focus and scope of the study was narrowed down. Besides, Bangladesh Railway is a large organization with more than 12 departments. So, it was very difficult to obtain data, information from all these departments. The number of respondents of the questionnaires was also limited as limited response and feedback were obtained for quantitative data. Secondary data source, like internet, published data, etc. were used to carry out the research methodology. So, the findings may slightly vary from the actual scenario. Limited allocation of budget was also a constraint to carry out the research.

### **1.11 Structure of the report**

The study report consists of four chapters. The first chapter is A Brief Overview of Bangladesh Railway and Research Methodology - covering overview, problem statement, scope, rationale, research questions, and an explanation on the data collection methods and justification for using the methods, analytical frame work of the study and limitations of the study. It also depicts the structure of the thesis report. Chapter Two consists of a Literature Review- covering the discussion on the existing literatures and conceptual framework of this research. Chapter three holds Data Analysis and Result Discussion-covers analyzing the data, interpreting the results and findings. Chapter four is the final chapter: Conclusion and Recommendation-contains a decisive conclusion and recommendation on the cost reduction

approaches that could be applied in Bangladesh Railway. The recommendations are made to overcome the challenges to implement the cost reduction approaches.

### **1.12 Conclusion**

In this introductory chapter of the dissertation an effort was made to introduce Bangladesh Railway and its present condition. Also the research topic, problem statement and research objective, rationale of the study and the methodology of carrying out the research was discussed.



## Chapter 2: Literature Review

### 2.1 Introduction:

In this chapter the existing literature and conceptual framework of cost and the cost reduction strategies and approaches in procurement & supply chain management will be discussed.

### 2.2 A brief overview of Cost

Every organization incurs cost to run its process, operation, business and all other activities. In case of a private organization the main objective is to maximize profit and shareholder's value which is achieved if the operating cost is less the generating revenue. So, a reduction in the cost without compromising the quality of goods or service of an organization is good for business. In case of a Public organization which is run by the tax payer's money the general objective is to achieve value for money and greater social, economic well being of the people rather than profit maximization.

In terms of procurement and supply chain management, Cost is what the buying organization pays to acquire the goods or services purchased. This may be much more than just the purchase price paid to the seller: it will also include a range of acquisition, installation, maintenance, operating, insurance and disposal costs. It is also worth noting that the seller also has costs: the finance and resources it expends in producing and providing goods and services.

### 2.3 Understanding costs: Components of the cost base

There are three major areas in which an organization incurs costs.

- **Raw materials** (and/or components, subassemblies and consumables): the 'inputs' to the manufacturing or operational process
- **Labor:** the wages or salaries of workers employed by the organization
- **Overheads:** expenditure which cannot be directly identified with the output of any particular production item, but is associated with keeping business processes up and running. Overheads may be sub-divided into production or manufacturing overheads (eg. electricity, maintenance and setup costs); administration overheads (eg office expenses and management costs); and selling and distribution overheads (eg marketing, advertising and sales force costs, and storage, transport and logistics costs). Marketing and logistics may be considered as separate categories of cost.

It is worth emphasizing that the supplier profit (or profit margin) is not a cost - although, along with costs, it is a component in price or in the supplier's pricing decision.

## 2.4 Direct and indirect costs

One common way of classifying costs is to distinguish between direct and indirect costs.

### 2.4.1 Direct costs

Direct costs are costs which can be directly identified with a specific saleable unit of output. So, for example, the direct costs of producing the textbook you are reading include: direct materials (such as paper, ink and glue); direct labor (wages paid to employees working on the production of the book); and direct expenses (eg costs of royalties payable to the author of the book, on a per-copy basis).

### 2.4.2 Indirect costs

Indirect costs (or overheads) are expenditures on labor, materials or other items which cannot be identified with a specific saleable unit of output. For example, the indirect materials costs of this book might include the oil used to lubricate the printing press; and indirect labor costs might include the salaries of the shift supervisor and sales staff. (These costs contribute to all jobs performed by the printing press - not just this one.) Such costs are often classified as production overheads, administration overheads and selling and distribution overheads. [4]

We can therefore build up an overall picture of a manufacturing operation's costs as follows:

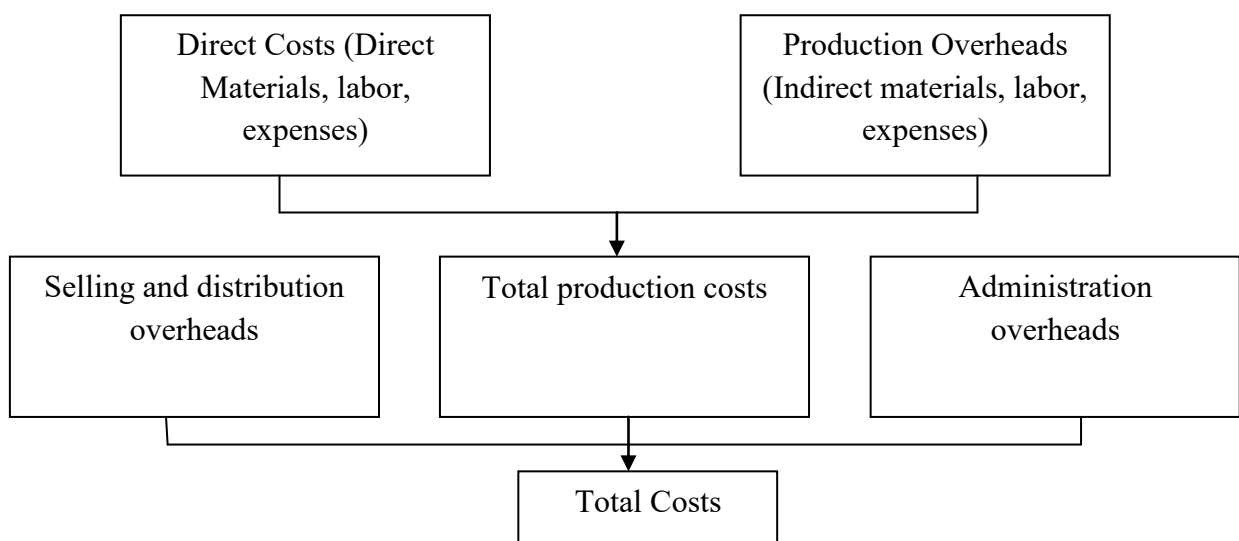


Figure 2.1: Total Costs

## **2.5 Fixed and variable costs**

Cost behavior is the way in which the costs of output are affected by fluctuations in the level of activity: the volume of production, say, or the level of sales.

### **2.5.1 Fixed Cost**

Some costs do not vary at all as the volume of sales or production changes. If an organization is paying rent on a factory, or paying employees a salary (not based on output), it will have to pay the same amount for a given period, whether the factory is operating or not, and however much it is producing. This type of cost is called a fixed cost.

### **2.5.2 Variable Cost**

Some costs vary as the volume of sales or production increases and vice versa. This type of cost is called a variable cost.

## **2.6 Different approaches to calculating costs**

There are two main approaches that may be adopted in calculating the costs of operations and products or services, whether for a supplier, or for the buying organization.

A marginal costing approach uses only the marginal cost of producing additional units: basically, using only variable costs to derive a unit cost. Marginal cost is the cost of one unit of product or service which would be avoided if that unit were not produced or provided. Variable costs are included in the unit cost, but fixed costs are not: they are treated as a 'period cost' and deducted, as a total amount, from total contribution to profit for the period, in the firm's profit and loss account.

An absorption costing approach attempts to calculate the total cost of producing products. In addition to variable cost, a 'fair' proportion of fixed costs is allocated to (or 'absorbed into') each unit of output, as a fixed cost per unit. This may be done by determining the amount of some measurable resource consumed in a production period (say, labor or machine hours) and the overhead cost of that resource (eg total fixed overhead costs divided by labor or machine hours = overhead absorption rate per hour). Alternatively, a more accurate approach may be used, called activity based costing: fixed costs are allocated to products on the basis of the cost of the activities used in creating them. [4]

## **2.7 Cost estimation**

The main principle involved in controlling costs is to estimate in advance what the costs are expected to be; compare the estimate with actual outcomes; and investigate any significant discrepancies or variances. To get started on the process of estimating costs we need a good understanding of cost behavior. Specifically, we need to know which costs are variable (because the level of these costs will depend on the estimated level of activity), and which costs are fixed (and will be unaffected by the level of activity). Fixed costs are easy, as they may be known or routine costs, and will not vary in line with sales volume. Once we have forecast a level of sales for the budgetary period, it should be possible to estimate the costs that depend on sales volume.

### **2.7.1 Dealing with mixed costs**

Some costs include a mix of fixed and variable elements. These are sometimes called semi-variable costs, or mixed costs. For example, the cost of heat and light will to some extent be fixed, because the premises must be heated and lit during normal working hours. However, there may also be a variable element in this cost, perhaps because additional hours are being worked as overtime. In these cases, it is necessary to determine the amount of the fixed element included in the mixed cost. A common technique for achieving this is the high-low method. This is based on looking at the total cost at a time when activity is at a high level and comparing it with the total cost at a time when activity is low.

### **2.7.2 Statistical techniques for cost estimation**

Predictions and estimates of cost are generally made by using the following sources of information:

- Historical data
- Current data and information (such as that available from suppliers)
- Market research and environmental monitoring, to identify 'what is happening' within the supply market (affecting costs and prices)

Statistical methods are unlikely to take into account all the various environmental factors which may cause fluctuations in costs. A number of more subjective or 'qualitative' methods may therefore be used, based on the knowledge, experience and judgment of expert users, buyers, suppliers or consultants. Supply market research and market engagement can be used to ascertain likely supplier costs, pricing decisions and market price levels and trends. Expert opinion is the gathering of views, judgments and opinions from people regarded as

Knowledgeable and experienced in relevant business areas, markets and disciplines (such as cost analysis).

### **2.7.3 Who should be involved in cost estimation?**

Procurement staff will be involved in relation to many categories of costs, and for all costs involving bought-in materials and services. They are likely to be most aware of the prices that they have been obtaining from the suppliers of such goods, and of any likely changes (arising, perhaps, from newly negotiated agreements with the suppliers).

Finance and accounting staff will also be involved. Estimates of costs are very much their province, and they have ready access to historical cost trend data, which are often important starting points in estimating future cost levels.

Marketing staff will also be involved, since they are in the best position to forecast the likely level of sales, which is usually the 'principal budget factor', because it dictates the level of variable costs. The level of sales has a knock-on effect on many cost areas - most notably on production costs, because the level of production will depend mainly on the level of expected sales.

## **2.8 Value for money in public sector**

Increasingly the role of procurement is not merely to fulfill operational or technical requirement but to operate profitably, achieving value for shareholder in the private sector and in the public sector to achieve service delivery representing better value for money in the use of public funds. Public sector organizations have primary orientation to achieving defined service levels: providing efficient and effective services (education, transport, healthcare) and utilities (water, power) to the public often within defined budgetary constraints and environmental and sustainability strategies [5].

The range of stakeholders in public sector is more diverse, including funding and user groups. This creates a more complex network of stakeholder expectations, relationships and accountabilities to be managed [5].

Traditionally, measures of VFM have been based on prices paid and cost savings. However a more holistic concept of VFM was advocated in the 1995 White Paper Setting New Standards, and OGC guidance, UK. 'All public procurement of goods and services, including works, must be based on value for money. Value for money is not about achieving the lowest

initial price: it is defined as the optimum combination of whole life costs and quality.’[6]This reflects increased emphasis on:

- The importance of taking into account all aspects of cost over time, rather than lowest purchase price.
- The importance of defining ‘value’ from the perspective of customer and meeting service level and quality requirements
- The importance of achieving efficiency (making best use of available resources) and effectiveness (accomplishing objectives) – in addition to economy (using the least possible resources).

### **2.8.1 Assessing value for money**

The National Audit Office, UK uses three criteria to assess the value for money of government spending i.e. the optimal use of resources to achieve the intended outcomes [7]:

- Economy: minimizing the cost of resources used or required (inputs) – spending less;
- Efficiency: the relationship between the output from goods or services and the resources to produce them – spending well; and
- Effectiveness: the relationship between the intended and actual results of public spending (outcomes) – spending wisely

### **2.8.2 Achieving value for money**

Guidelines from Treasury and the NAO, UK in 2004 identify a number of ways of achieving VFM in public procurement [6]:

- More efficient processing on transactions and reduced processing overheads
- Getting better VFM for goods and services purchased.
- Direct negotiation with supplier.
- Collaborative and consortium buyers
- Improving project, contract and asset management
- Making procurement decision on the basis of long term value
- Combining competition with innovative procurement methods (while managing risks effectively)
- Utilizing e-procurement and good practice

## 2.9 Cost reduction strategy

Every organization operates in a competitive environment. Organizations can only sustain if they can hold the competitive advantage with their rivals. Bangladesh Railway, a public organization has an advantage in this regard as it is the only organization that provides railway transportation services in the country. But there is increasing pressure from road transport, water transport and air transport. So, in order to sustain in the transportation market and make profit BR has to take a long term competitive strategy that enables it to reduce its cost without compromising quality. This research paper assumes that BR would take a cost leadership strategy and hence tries to find out the cost reduction approaches in terms of supply chain management.

Professor Michael Porter (Competitive Advantage) proposed a classic model for strategic choice. Based on competitive themes which are very general and therefore applicable across a range of organizations and situations, the strategies it presents are 'generic': broad categories, rather than detailed strategic plans. They are designed to be used at the business (SBU or product) level rather than at the higher corporate level: a complex organization may adopt a mix of the strategies across its product portfolio.

Porter suggested that a firm may seek two basic kinds of competitive advantage, or 'edge' over its rival's in a market: low cost or differentiation. In other words, competitive advantage is obtained either by: Providing comparable value to the customer more efficiently than competitors (low cost), or by Performing activities at comparable cost but in unique or distinctive ways, creating more value for customers than competitors and commanding a premium price (differentiation). At the same time, an organization can choose to apply either of these strategies either to a broad market or to a narrow-focused or targeted market (or market segment). Porter identified the various permutations as three generic strategies:

**Cost leadership:** seeking to become the lowest cost producer in the industry as a whole

**Differentiation:** seeking to exploit a product or service perceived as 'different' or 'unique' in the Industry as a whole

**Focus:** targeting activates to a selected segment of the market, either by providing goods or services at a lower cost to that segment or by providing a differentiated product or service for the needs of that segment [8].

	Lower cost	Differentiation
Broad	Cost leadership	Differentiation
Narrow	Cost focus	Differentiation focus

Figure 2.2 Porter’s generic strategies; Source: The Chartered Institute of Procurement & Supply, (2012) Improving the competitiveness of supply chains, Profex Publishing Limited, United Kingdom

### 2.9.1 Competitive Advantage

Johnson, Scholes and Whittington identify four key cost drivers that can help drive cost leadership.

Input costs, such as labor and materials. Many SBUs seek to offshore labor-intensive operations in low-labor-cost countries, and a key strategic contribution of the procurement and supply function will be to reduce and manage external expenditure on inputs.

Economies of scale, the reduction of average costs as a result of increasing scale of operations, eg by spreading fixed costs over higher levels of output

Experience and learning curve effects, whereby efficiency and productivity increases with experience, expertise and learning overtime, enabling a reduction in unit costs. Systems and practices may be refined and streamlined, for example, and collaborative efficiencies gained through developing supply chain relationships.

Product/process design, where efficiency is ‘designed in’ through value engineering to optimize whole life costs

Pursuing an overall cost leadership strategy will require an SBU to adopt tactics such as: large-scale production for economies of scale ('high-volume, low-cost'); enhancing productivity through technology; seeking continual improvement and waste reduction; and minimizing overhead and supply costs. In high technology and highly skilled industries,



producing more items than competitors may also allow the firm to benefit from the learning or experience curve effect, to achieve lower average costs.

From a procurement and supply chain perspective, the major implication of a cost leadership strategy is the emphasis on cost reduction, through measures such as inventory minimization, robust requirements and transport planning, variety reduction and quality control, transaction streamlining, price negotiation, aggregation of requirements, supply base rationalization and so on.

## **2.10 Cost reduction activities**

The reduction and management of costs (including the procurement price of goods and services) will be a key objective to support the financial objectives of the firm (profitability, liquidity, return on capital invested and so on), even in the public sector (with goals such as value for money service provision and efficiency targets). It will also be the cornerstone of competitive advantage based on cost leadership.

Emmet argues, succinctly, that cost strategies are about 'knowing what the costs really are and then looking at how to reduce them'. You first have to apply effective cost analysis, with a particular focus on whole-life costing, total cost of ownership or total acquisition costs: purchase price plus delivery, support, consumables, staff training, inventory and handling costs, inspection, maintenance and repair and so on, over the useful life of the asset. Then you are in a position to look at eliminating waste, negotiating on price and so on.

Beyond the management of input prices, procurement can contribute to cost reduction and management; by a wide range of means, at the strategic, tactical and operational levels. In the following integrative overview, we divide activities broadly into:

Short-term operational or tactical cost reduction measures, which might be implemented relatively quickly to resolve immediate cost inefficiencies; and

Longer-term strategic cost reduction measures, which might require more far-reaching research, consultation, planning and change management

### **2.10.1 Short term or tactical cost reductions options**

Some 'immediate' or short-term cost elimination or reduction options may include the following [8]:

- Challenging internal customer requisitions and specifications, to reduce: unnecessary consumption; unnecessary procurements (in favor of in-stock items, - shared, leased

or recycled alternatives); over specification; and use of branded items and OEM spares (rather than cheaper generic items)

- Improving the accuracy of demand forecasting, in order to avoid unnecessary procurements and inventory levels
- Controlling ‘maverick’ buying by users, which may lead to unnecessary purchases; higher prices, due to small-volume orders and lack of purchasing disciplines and negotiation skills; proliferation of the supplier base; and/or stock proliferation (due to lack of standardization). Maverick buying may be controlled by the use of 'call-off' contracts, the enforcing of approved supplier lists, limits attached to purchasing cards and so on.
- Consolidating or aggregating requirements to reduce transaction costs, and secure price leverage and volume discounts eg by using purchasing cards; negotiating volume, systems or call off contracts; or initiating consortium or collaborative procurement. This may also be supported by standardization and variety reduction exercises.
- Negotiating ‘harder’ for reductions in prices and costs with suppliers, for new contracts or contracts coming up for review. This may be supported by centralizing negotiation, to leverage procurement expertise and buying power. However, the long-term ‘side effects’ on quality and relationships should be considered: this tactic will only be appropriate for routine or leverage procurements.
- Proactive sourcing: challenging preferred supplier complacency to ensure competitive value (eg by re-opening contracts periodically to competition)
- Utilizing available technology tools more effectively to reduce prices and tendering or sourcing costs (eg utilizing e-auction and e-tender mechanisms for appropriate procurements)
- Operating tendering and contracting processes more efficiently
- Reducing costs of quality failure (eg inspection and defect costs), by improving supplier selection and contract management. (Longer-term approaches to the same aim include developing supply chain quality assurance processes and negotiating continuous improvement initiative).
- Using value analysis (‘analyzing the function of a material, part, component or system to identify areas of unnecessary cost’ and/or value engineering (the application of value analysis at the product development stage) to eliminate wastes.

- Considering the use of international (particularly low-cost country) suppliers for new contracts and contracts coming up for review/ for appropriate procurements. (Since this is a tactical proposal, it may apply to low-risk procurements from relatively established suppliers: strategic approaches to global sourcing require more rigorous planning)

### **2.10.2 Long term or strategic cost reductions options**

Some longer- term strategic cost reduction (or efficiency or value gain) options may include the following [8]:

- Restructuring: delayering, downsizing or horizontalizing purchasing structures, to minimize labor and overhead costs and maximize process efficiencies (less duplication of effort/ fewer managerial and coordinatory mechanisms and so on)
- Centralizing procurement (to take advantage of aggregated orders and bargaining leverage) or decentralizing procurement (to reduce transport and storage costs)
- Process engineering or re-engineering, to streamline and integrate processes, eliminating unnecessary activities and process inefficiencies.
- Applying ICT and automaton technologies to streamline processes (eg using e-procurement) ; increase productivity and reduce labor costs (eg through automaton); secure competitive pricing (eg through global sourcing or e-auctions); support more efficient planning and decision-making (via computerized planning models)/ and so on.
- Developing collaborative supply relationships for cost and price advantages : rather than applying competitive leverage to secure low prices, developing collaboration to reduce sourcing and transaction costs, encourage mutual cost transparency and cost reduction and so on.
- Rationalizing the supplier base (fewer suppliers in closer long-term relationship supported by the consolidation and aggregation of requirements (eg by standardization and variety reduction), in order to reduce sourcing costs and facilitate collaborative long-term cost reductions.
- Developing lean supply and production: eliminating wastes from processes throughout the supply chain (eg through better demand forecasting and materials planning); reduction of inventory through just in time techniques; efficient process layout and transport planning; minimal defects and wastage through quality management etc.

- Collaborating with key supply chain partners on cost reduction programmes (perhaps based on target costing).
- Investigating the potential for global and low-cost country sourcing - for appropriate procurements, bearing in mind the additional costs of transport, risk, quality and contract management.
- Considering the outsourcing (or off shoring) of non-core activities where value can be obtained at less cost, the organization can divest itself of assets, and internal resources can be more efficiently focused - and bearing in mind associated risks and costs.

### **2.11 Whole life costing or lifecycle costing**

The modern procurement view is that 'cost' and 'value' are far broader concepts than just the purchase price of an asset. Current thinking emphasizes the 'total costs of ownership' (TCO), 'total acquisition costs' (TAC) or 'total lifecycle costs' which includes a package of costs not immediately apparent from the purchase price, and which may be incurred throughout the lifecycle (or useful life) of the asset. (This is particularly relevant to the procurement of capital items, such as constructions, equipment and vehicles, which typically have long working lives.) In this way of thinking, the 'right price' is one which represents value for money for the 'total package of benefits' being purchased over the whole life of the asset.

There is a vital difference between the purchase price of an asset (the sum paid to the supplier to secure access or ownership) and its total cost of acquisition or ownership. The total costs of ownership can be categorized under six headings, as follows [6]:

Pre-acquisition costs such as research, sourcing, preparation of tenders and structural changes to allow for the asset

Acquisition costs including the purchase price, the cost of finance (if borrowing is required to finance the procurement), delivery, installation and commissioning (starting operation)

Operating costs such as labor, materials, consumables, energy usage, and environmental costs (eg. disposal of wastes)

Maintenance costs such as spares and replacement parts, servicing, repair, periodic overhauls, and reduced output with age

Down time costs, such as lost production, extra labor, etc. if the asset stops working or fails to perform as it should.

End of life costs such as disposal, ongoing liabilities, decommissioning, and sale for scrap or resale.

Looked at from the point of view of the lifecycle of an asset, there may be costs associated with each stage of its working life:

- Procurement
- Delivery, installation and 'commissioning' (putting into action)
- After-sales support from the manufacturer
- Operational costs (including user training, consumables, energy and so on)
- Regular maintenance, repairs and periodic overhauls or upgrades
- De-commissioning (winding-down)
- Disposal (including any 'negative costs' - or revenue - available from sale of the asset, if it has any remaining value).

Some or all of these costs may be included in the price quoted by a supplier, and a purchaser will need to bear this in mind when comparing two quotations: does a lower price reflect competitive pricing - or a lesser total package of benefits?

More generally, there is a tradeoff between the purchase price and the total package of benefits. It is an obvious fact, yet a commonly ignored one, that a low price may lead to a high total acquisition cost. A lower price may reflect poorer quality, for example, and this will not necessarily be better value for money: the purchase price may be lower, but the total cost of acquisition and ownership may be higher, because of the need for more rigorous quality inspection, the number of rejects and reworks due to poor quality, lost sales through customer disappointment, and so on.

The procurement of capital assets illustrates the difference between purchase price and total costs particularly clearly. Such assets by their nature have a long life in use, and will give rise to many costs in addition to the original cost of purchase. CIPS therefore consider whole-life costing (or lifecycle costing) as a best practice tool for evaluating options for any substantial procurement: establishing the total cost of ownership, and annual spend profile, over the entire anticipated lifespan of the product [17].

Whole life costing can be defined as 'economic assessment considering all agreed projected significant and relevant cost flows over a period of analysis, expressed in monetary value. The projected costs are those needed to achieve defined levels of performance, including reliability, safety and availability' (ISO 15686 Whole Life Costing Standard) [16]. In whole

life costing, all costs over the life of goods and services are taken care into account. This enables savings in running costs to offset any increase in capital costs. The savings are calculated for each year of the equipment or service contract life. It shows either a simple payback time or the payback during the life of the equipment or service contract.

## **2.12 Value analysis**

Value analysis has been defined as ‘the organized, systematic study of the function of a material, part, component or system to identify areas of unnecessary cost. It begins with the question “What is it worth? And proceeds to an analysis of value in terms of the function the item performs’ [9]. The terms ‘value analysis’, ‘value engineering) and ‘value management’ are often used interchangeably value improvement or value assurance.

The technique was originally developed by Larry Miles at the General Electric Company in the USA in 1947, while investigating the reason for wartime shortages of materials and labor. His idea was that careful attention to the makeup of products (what was included in a product and why) would reduce costs and improve quality [10].

The basic idea is to establish what function a particular part is fulfilling; then to consider the various design options for achieving this function to the desired standard; and finally, to analyze the cost of alternatives. ‘Costs’ in value engineering may refer either to total lifecycle costs (in the case of capital equipment) or direct costs of production (in the case of consumer products).

This approach is summarized in the five 'tests for value that were developed in General Electric's pioneering use of the technique [11].

- Does use of the material, part or process contribute value?
- Is the cost of the material, part or process proportionate to its usefulness?
- Are all the product features actually needed?
- Can a lower cost method be used while retaining the features and functions that add value?
- Is anyone paying less for this part?

A helpful mnemonic for the areas focused on by value analysis on a value checklist is: STOPS WASTE [12]

- Standardization, or variation reduction (if an item is not standard, can a standard item be used? If it is a standard item, does it completely fit the application?)

- Transportation classification (is the item properly classified for customs and shipping purposes, to obtain the lowest transportation costs?)
- Over-engineering (eg are closer tolerances specified than are necessary?)
- Packaging (can the cost of packaging be reduced?)
- Substitute goods or components (is there a similar item in inventory that could be substituted?)
- Weight reduction (can the weight or capacity of the item be reduced without sacrificing functionality?)
- Any unnecessary processing (eg is unnecessary machining performed on the item? Are unnecessarily fine finishes specified?)
- Supplier's input (are suppliers being asked for suggestions to reduce cost?)
- To make rather than buy (can the item be made or bought more cheaply?)
- Eliminate waste, obsolescence, redundancy (can the item be eliminated altogether?)

The value analysis process consists of four main phases:

- Information: defining the problem to be solved; evaluating the feasibility of VA as an approach to the problem; gathering information about the problem; and allocating resources to the VA study
- Speculation: using functional analysis systems technique (FAST) to map the logical relationships between functions; creating a function-oriented cost model (allocating costs to functions on the FAST diagram); and using brainstorming (and other ideas generation techniques) to table a wide range of ideas for alternative approaches which might. Provide required functions at lower cost.
- Analysis: eliminating completely impractical ideas; applying cost comparisons to feasible ideas; selecting ideas which have best potential for cost savings; subjecting high potential ideas to in-depth feasibility study and lifecycle costing; and ranking ideas in terms of advantages and disadvantages, lifecycle costs, design criteria, reliability, safety and so on.
- Proposal: presenting the results of the study to relevant stakeholders; obtaining client approval; and securing the commitment of participant stakeholders.

The specific outcomes of a value analysis exercise may be reduced costs and/or improved quality, but this is not the only benefit to the organization. Individuals involved in this kind of exercise find that they look at their work in a different way, no longer regarding previous decisions and engineering as binding, but taking a fresh approach. The whole process of

value analysis therefore fosters a positive approach towards innovation and overcomes the entrenched resistance to change that may otherwise be encountered.

### **2.13 Value engineering**

The term ‘value engineering’ is generally used more specifically for the application of value analysis from the product design and development stage onwards. It involves cross-functional teams in this process, including specialists from all the functions that can contribute to overall objectives and external suppliers.

A possible problem with value analysis (where confined to existing products) is that changes in the configuration of one part or component may create difficulties in the assembly of the product of which it is a part. Another shortcoming is that where value analysis leads to change, it is in effect shortening the lifecycle of the product- which may cut short its profitable life. In contrast, value engineering aims [8]:

- To ensure quality is built in from inception, not merely ‘inspected in’ later
- To maximize cost efficiency of the design. (Estimates suggest that 60-80% of costs are committed at the design stage).
- To reduce the need for engineering changes at a later stage.
- To reduce time to market (the lead time between inception and launch).
- To reduce development and production costs.
- To improve cross functional collaboration and sensitivity to customer needs.

Many organizations now place considerable emphasis on value engineering all new products, to the extent that this is feasible. One example is the simultaneous engineering approach used by Ford and its supplier Pilkington Glass: the Ford car design and the Pilkington windscreen and windows are developed collaboratively. If the car design does not allow adequately for the thickness and structural integrity required of the glass components, both organizations can work together to make design improvements and modifications until a suitable product is engineered.

### **2.14 Information & Communication Technology (ICT)**

Automation and computerization rise productivity by allowing faster, more accurate, more consistent work than human beings can achieve alone. A supplier with access to advanced design, manufacturing, goods handling and transport technology should be able to fulfill orders faster, more cheaply and with more consistent (though not necessarily higher) quality.



Technology changes business processes. It may be used to perform operational functions more safely (eg automated production and materials handling) or easily (eg recording and tracking stock movements using bar-coding or RFID). In recent decades/ it has changed both production processes and supply and distribution processes .

Production processes, with an emphasis on labor-saving equipment and machinery - impacting purchasing through the need for investment appraisal and capital purchases. Examples include the increasing use of automated (or robotic) production, computer-aided design and manufacture/computerized monitoring of quality and process/ and so on.

Supply and distribution processes, Examples include: access to new global supply and product markets through e-commerce and faster transport; electronic sourcing and procurement systems; and new methods of service delivery (such as ATM machines, online entertainment, ticketing and online banking).

Technology changes the amount of labor and types of skills required by businesses (eg through the use of labor saving automaton) and how they can be organized and managed (eg the use of information and communication technology to facilitate of-site and mobile working, and 'virtual team working) . This may in turn support the use of outsourcing and subcontracting, which may be driven and managed by the procurement function. It may also create a changing skill profile for procurement staff (eg use of e-procurement tools).

The use of information and communication technology provides many more advantages which eventually end up saving cost to an organization. Such as:

- Dramatically increasing the speed of communication and information processing real-time answers to enquiries, updating of information and processing of transactions can be conducted via a computer network or the internet.
- Offering wider access to environmental and supply market information (especially from global sources) . The internet offers constant access to formal information resources (in the form of websites, databases, libraries, expert agencies and so on) and informal resources in the form of network contacts. This has had the effect of opening up new supply markets, by giving purchasers access to information about suppliers and supply markets worldwide. This saves time and money.

- Facilitating 24-hour / 7-day, global business. The internet and e-mail allow companies to offer service and maintain communication across office hours/ international time zones and geographical distances.
- Supporting paperless communications (eg electronic mail messages), business transactions (eg online ordering and payment) and service delivery (eg online ticket reservations, information and education services, and so on). Information storage and retrieval is less wasteful of physical space and resources and of administrative time.
- Offering opportunities for cost savings, through a wider supply base streamlined processes and lower prices (eg via e-auctions).
- Freeing up buyers time - previously taken up by routine and repetitive clerical tasks - for creative/ strategic and relational aspects of their roles.
- Enhancing management information (eg via databases and systems which record, store and analyze a wide range of transaction, business and environmental data).
- Creating 'virtual ' supplier relationships, teams and organizations, by making location irrelevant to the process of collaboration.

#### **2.14.1 E-purchasing**

CIPS defines e-purchasing as ‘the combined use of information and communication technology through electronic means to enhance external and internal purchasing and supply management processes’[6]. There is a significant potential cost saving (for both buyers and suppliers) in the effective automation of procurement, through streamlining and speeding up processes: minimizing inefficient (and potentially inaccurate) manual data and document handling tasks such as data input and transfer , verification, calculation, formatting, disseminating; and so on. Survey results indicate a 10:1 cost ratio when comparing manual to automated processing costs.

#### **2.14.2 E-tendering**

The use of e-tendering replaces traditional manual paper-based processes for competitive tendering (with electronically facilitated processes based on best tendering practices. It reduces tender cycle times; reducing labor intensive tasks and paperwork; and enabling procurement specialists to focus on more strategic value-adding activities. E-tendering gives

non-discriminatory access to the tender process for small suppliers and worldwide suppliers (which may offer cost or innovation benefits to the buyer).

### **2.14.3 Intranets**

An intranet is a set of networked and/or internet-linked computers. This private network is usually only accessible to registered users, within the same organization or work group. Access is restricted by passwords and user group accounts, for example [6].

Intranets offer significant advantages for integrating internal communications. They support multi-directional communication and data-sharing; link remote sites and workers in virtual teams; allow authorized access to shared database and e-procurement platforms; give employees wider access to corporate information; encourage more frequent use of reference sources (such as procurement manuals, standing orders and policies) and updating of information; and save on the costs of producing and distributing the equivalent printed documents and messages.

### **2.14.4 Materials requirements planning (MRP)**

Materials requirements planning (MRP) is a set of logically related procedures, decision rules and records for managing dependent demand items. It is designed to develop a master production schedule (MPS), from which can be derived a bill of materials (a breakdown of all the materials and components required for production) into time-phased 'net-requirements' (taking into account existing stock levels) which trigger requisitions and procurements of appropriate quantities at appropriate times [6].

The MPS is derived from the company's sales forecast, actual sales data, current customer orders and relevant production policies and schedules. The MRP software 'explodes' the MPS into a bill of materials (BOM): calculating how many of each component is required in order to manufacture the finished products specified in the MPS, based on materials specifications. The inventory status file supplies data on which of the required items are already in stock, and in what quantities, in order to arrive at a 'net requirement' for each material and component (to be procured from suppliers).

The system takes into account estimates of supplier lead times for the items required (based on historical data or contract terms where available), to arrive at a time-phased procurement schedule for items.

The production of the MPS and the running of the MRP program lead to a detailed and timetabled approach to planning orders and production; the system is based on customer demand and software is increasingly capable of responding to changes in demand by producing revised schedules. The emphasis on end customers is in line with modern management thinking, which stresses that customer needs should shape action throughout the organization.

MRP systems emphasize the importance of precise and accurate ordering and production policies, which if successfully followed will lead to reduced inventory levels. By focusing management attention on production schedules well in advance, MRP systems can give an early warning of potential problems in production or hold-ups in the supply chain.

#### **2.14.5 Enterprise resource planning (ERP)**

ERP systems are cross-functional and enterprise-wide: all functions involved in operations are integrated in one system - including manufacturing, warehousing and distribution, accounting, HR, marketing, strategic management and procurement. CIPS defines ERP as: 'Computer-based systems designed to process an organization's transactions and facilitate integrated and real-time planning, production and customer response.'

The benefits claimed for ERP include integration and automation of many business processes; a general reduction in process cost; efficiency and flexibility gains; standardization and sharing of data and practices across the enterprise; generating and accessing decision support information on a real time basis; quicker response times and improved customer service; improved communication and data sharing and potentially improved supply chain management and relationships.

#### **2.15 Just in time supply**

Traditional manufacturing systems have assumed that there are certain good and necessary reasons for holding inventory. Inventory reduces the risks of disruption to production from unforeseen events. Safety' or /buffer' stocks allow the organization to keep working if supply is disrupted by strikes, transport breakdowns, supply shortages, supplier failure and so on. Inventory 'buys time' for purchasers to find alternative sources of needed materials. This is particularly important for items which are critical for operations: it would be disastrous if a firm ran out of such items and some stock must be held in order to avoid this.

However, it is recognized that excess inventory is a source of waste: tying up capital in 'idle' stock; wasting storage space; risking loss of value through deterioration, theft or damage; risking obsolescence or disuse; incurring holding costs (warehousing, insurance and so on); and serving to hide operational inefficiencies (by providing a 'safety net' for disruptions to supply, long lead times or poor demand forecasting).

Just in time (JIT) supply is a radical Japanese approach to inventory reduction which aims to ensure that inputs only arrive at the factory (and particular work stations in the assembly line) 'just in time' to go into the production process. This is part of a broader management approach, based on [8]:

- Eliminating process wastes (non-value-adding activities and costs)
- Performing tasks only as and when required

The philosophy of JIT is that 'inventory is evil': buffer stocks merely serve to hide operational inefficiencies. If no inventory is held, process problems, wastes and risks can be exposed, recognized and resolved. In JIT therefore, every effort is made to minimize stock holding by manufacturers, by securing demand driven late delivery of required quantities of supplies as a basis for a wider programme of process waste elimination. At the same time given such 'tight' time and quantity parameters, the buyer cannot afford any defects in the supplies delivered, necessitating rejects or rework. Significant effort is therefore also put into 'zero defects' quality management. Delivery must be on time, in full and fit for purpose every time.

## **2.16 Lean supply**

The phrase 'lean supply' was coined by Richard Lamming [13] as a result of research into Japanese supply chain strategies. Supply chain rationalization, dominated the Japanese approach, allowing time and resources to be used in a more focused manner for process improvement and new product development. The lean supply concept has evolved as businesses increasingly look beyond their own enterprise boundaries to gain competitive advantage.

Lamming defines lean supply as: 'the elimination of duplication of effort and capability in the supply chain, combined with a philosophy of continuously increasing the expectations of performance and self-imposed pressure to excel.' He goes on to argue that: 'This is achieved by recognition of mutual dependence and common interest between customer and supplier beyond the principle of operational collaboration'. Lean supply networks collaborate

intentionally, in order to progressively eliminate cost and waste (at any and all points of the supply chain), with the overall goal of optimizing the customer value stream.

Here are some benefits claimed for lean supply:

- The progressive removal of wastes, reducing costs and improving quality
- Closer collaborative relationships within the supply chain, treating opportunities for shared competitive advantage and synergies
- Cross-functional team working, involvement and flexibility within the organization (with flow-on benefits for organizational learning and continuous improvement)
- Reduced inventories (also improving cash flow)
- Shorter cycle and delivery times, enabling better service to consumers
- More efficient process flows, allowing better resource utilization
- Fewer defects, creating customer loyalty and lower failure costs

### **2.17 Standardization and variety reduction**

The term 'stock proliferation' is given to the tendency for organizations to accumulate increasing numbers of similar but slightly different stock items, over time. Unnecessary stock proliferation is highly undesirable, because the organization ends up carrying more stock than it needs to: incurring unnecessary costs.

There are essentially two methods of minimizing stock proliferation: standardization and variety reduction.

Standardization involves agreeing and adopting generic specifications or descriptions of the items required.

Variety reduction is a systematic rationalization or reduction in the range of items used, stocked, bought or made.

A proactive approach to variety reduction means that, where possible, the organization is committed to using standardized components and parts to make end products that are dissimilar in appearance and performance: in other words, it uses the smallest range of inputs to produce the widest range of products. Among other requirements (such as senior management commitment), this requires input from procurement and stores staff, at the specification stage, to challenge, question and justify non standard requirements in meeting the business need.

A reactive or remedial approach to variety reduction is undertaken periodically by a specialist team comprising relevant stakeholders. The team examines a range of stock items to determine; what range of variant characteristics is essential; the extent to which existing stock items can be given standard specifications, or substituted for each other; and which items may be eliminated or substituted.

The standardization of procured items offers potential for efficiencies and cost savings in several areas:

- Specification: eg specifying generic items rather than more costly bespoke own-design or variant items; specifying stocked or registered items rather than new buys (minimizing procurement costs)
- Purchasing: eg enabling the consolidation of requirements (rather than multiple small orders of variant items), to take advantage of bulk discounts and reduced transaction and materials handling costs
- Transport: eg enabling the use of standard load and container sizes to enable inter-modal transport and efficient load planning
- Inventory: eg through reduced storage space requirements, and reduced risks of obsolescence and deterioration, for slow-moving or little-used variant items
- Quality management: eg making it easier to inspect and measure quality and conformance, since there is less variety and variation in the expectations and standards applied; and improving supplier relationship management (with a rationalized supplier base).

## **2.18 Supplier rationalization**

Supplier rationalization, or supply base rationalization, is the process of optimizing the number of suppliers the organization deals with. This is mainly a process of reduction or consolidation. As we have seen, the general rationale for reducing the number of suppliers is to develop and leverage longer-term, closer, value-adding relationships with fewer, high capability suppliers. This contributes to cost advantage in the following ways [8]:

- Reducing market engagement, sourcing and transaction costs reducing supplier management costs
- Freeing up procurement capability for strategic cost reduction activities (including developing closer collaborative relationships with remaining suppliers)

- Leveraging supplier relationships and capabilities for ongoing continuous improvement, waste elimination and other cost reduction programmes
- Rewarding the best suppliers with extra business, which may provide an incentive to competitive supply and ongoing cost reduction
- Supporting the aggregation of requirements (fewer, larger orders) allowing volume discounts, reduced transaction costs and other economies of scale.

Businesses should be careful not to rationalize the supply base purely in the expectation of cost reductions; rationalization should be 'part of a developed supply strategy that meets the future needs of the business and optimizes value. The business objective should be to find the right suppliers – not necessarily the fewest.

### **2.19 Aggregation of requirements**

The aggregation and consolidation of requirements means fewer, larger orders, placed with fewer suppliers. This offers the supply chain potential for:

- Economies of scale, allowing a reduction in transaction costs (with fewer individual transactions) transport costs (with fewer individual deliveries) and production costs (larger production runs)
- Volume related price advantages (eg volume discounts or avoiding minimum order penalties and premiums) - with corresponding cost advantages for suppliers (a rising from economies of scale)
- Volume related bargaining power for the buyer, allowing increased price and negotiation leverage
- The ability to rationalize the supplier base

Aggregation of requirements can be achieved by measures such as the following:

- Centralizing procurement, in order to facilitate cross-organizational consolidation of requirements (and supporting measures such as standardization and variety reduction)
- Using purchasing cards for low-value, recurring purchases (eg MRO supplies) for the consolidation of invoicing
- Negotiating volume, systems or call-off contracts
- Imitating consortium or collaborative procurement with other sites units or organizations with similar requirements



- Implementing standardization and variety reduction exercises, to reduce small orders necessitated by unnecessarily varied specifications
- Designing or redesigning logistics networks to support consolidated orders. Distribution centers/ or a network of regional distribution centers (RDCs), can be used to: Break bulk ('hub and spoke'): a single large or bulk delivery can be ordered from the supplier, and split up into consignments for separate sites and users. Consolidate deliveries ('merge in transit'): multiple items, delivered by different suppliers, can be combined for single delivery to sites and users. This cuts down on the number of transport trips (saving on transport and fuel costs and reducing environmental impacts) and fills up the transport for each delivery (not wasting space or cost). Meanwhile, users receive only one (multi-item) delivery rather than having to process multiple (single item) deliveries, reducing receiving traffic.

## **2.20 Consortium procurement**

A buying consortium is a group of separate organizations that combine together for the purpose of procuring goods or services. A buying consortium might be created when a group of organizations see mutual benefit in aggregating their requirements: creating larger contracts, for economies of scale and increased bargaining power to secure advantageous terms. This might be especially beneficial if one organization's requirements, on their own, are insufficient to attract attention or discounts from high quality suppliers.

The benefits of consortium procurement may be summarized as follows.

- By means of enhanced bargaining power, the consortium can obtain discounts that would not be available to individual members although there may be difficulties in allocating such discounts fairly among them.
- A consortium can establish framework agreements, simplifying purchase administration for members. This can lead to significant reductions in transaction and contracting costs, especially in the case of low-value items where the administrative cost is disproportionate to the purchase price of the Items.
- Consortium members can pool expertise, knowledge and contacts, where these would be beneficial for particular procurement categories or exercises.

## 2.21 Negotiating reductions in price and cost

Squeezing suppliers in hard-bargaining price negotiation is the traditional competitive approach to tactical cost reduction: effectively, making the reduction of a quoted or contracted price, by an agreed amount, the condition for winning or retaining a contract:

- This approach may secure short-term cost reductions, where this is a priority.
- It may be the optimal approach for 'leverage' or 'tactical profit' procurements, for which securing best price and terms is the main consideration.
- It may be specifically indicated where the buyer has reason to believe that a supplier is growing complacent about cost management (and could therefore benefit from an incentive to, improve its cost structure) or is reaping unreasonable profit margins from its pricing.

However, adversarial negotiation is increasingly recognized as ineffective as an approach to strategic, high risk categories of procurement, for which security of supply, and the need to secure the co-operation and competencies of supply partners, is the priority: It is also likely to be counterproductive in the long term, for the following reasons:

- Increased sustainability risk (arising from supplier financial instability and failure) and resulting reputational risk (arising from the perception of irresponsible or unethical procurement practices by the buyer)
- Lower levels of service and quality, arising either from suppliers being forced to 'cut corners' to reduce costs, or from deterioration in the buyer-supplier relationship and supplier commitment

This is not to say that there is no place for negotiation in price and cost reduction. However, the focus -within collaborative supply chain relationships may be on:

- An integrative or 'win-win' negotiating style, ensuring that: supplier cost concerns are heard; suppliers are encouraged to secure sustainable profit margins; and concessions or benefits are traded so that both parties gain from the outcome
- The negotiation of incentives, gain share or risk and reward agreements, so that the benefits of supplier cost reductions are equitably shared.
- The negotiation of long-term, demand-driven contracts, to reduce transaction (selling and buying) costs and to support suppliers in cost-efficient planning and capacity utilization. Examples include: Blanket ordering, under which a supplier undertakes to provide an estimated quantity of items over an agreed period of time at an agreed

price with simplified 'release' procedures for orders made under the contract as and when required. Call-of contracts, under which the buyer undertakes to purchase a given quantity of items or services over the period of the contract: again, with simplified 'release' or call -off' procedures for orders made as required. Systems contracts, under which a 'master contract is negotiated covering agreed terms and conditions for the recurring procurement of a particular item or items. Such contracts are generally placed on an exclusive basis, as it implies a high degree of trust: the supplier is faced with uncertain demand, a high requirement for service performance) and therefore the risk and cost of holding inventory. Volume contracts, offer price incentives for higher volumes of demand (encouraging demand aggregation). From the supplier perspective, volume-related revenue plus increased demand visibility also offer incentives [8].

## **2.22 Outsourcing**

Outsourcing may be defined as the process whereby an organization delegates major non-core activities or functions, under contract, to specialist external service providers, potentially on a long-term relational basis [4]. Outsourcing may be undertaken:

- On a project basis eg for the duration of an IT systems development, R & D, management consultancy, relocation or construction project. (The project management itself might also be outsourced)
- On a long-term ongoing basis: where the outsource supplier is given full responsibility for a selected function, such as cleaning or security.

Organizations now routinely contract with specialist external suppliers to provide services such as cleaning, catering, security, facilities management, IT management, recruitment and training, accounting, legal, transport and distribution and procurement.

A parallel development has been the growing emphasis on outsourcing public service delivery in the public sector: the 'commissioning' or 'externalization' by local authorities of services previously provided to the public by local authorities themselves (such as housing and roads construction, garbage removal; leisure and arts services, children's and youth services; health and aged care services, and so on), where external partners especially in the private and third sectors have better resources or capabilities to meet community needs.

In the absence of the profit motive; the main driver for public sector strategy and policy is the need to develop and maintain the quality of services delivered to the public, while

simultaneously ensuring best value use of public funds. The practice of outsourcing or commissioning services in the public sector has been promoted by pressures for improved efficiency and value for money (and cost reductions).

Outsourcing allows the organization the following benefits:

- To focus its managerial, staff and other resources (including capital funds) on its core, distinctive, competitive competencies.
- To leverage the specialist expertise, technologies, resources and economies of scale of suppliers, with potential to add more value at less cost than the organization could achieve itself for non-core activities.
- To increase the flexibility of productive capacity in response to fluctuations in demand
- To benefit from cost certainty in the performance of activities (through a negotiated contract price for outsourced provision, transferring cost-related risks to the external supplier).
- Outsourcing supports organizational rationalization and downsizing: reduction in the costs of staff, space and facilities.
- Cost certainty (negotiated contract price) for activities where demand and costs are uncertain or fluctuating; shared financial risks.

## **2.23 Quality assurance**

Quality is a critical success factor for most businesses, because it determines customer satisfaction the ultimate source of competitive survival and advantage. The ability of a company to differentiate its products and services in the marketplace substantially rests on the quality of its total offering its ability consistently to satisfy, delight and retain its customers.

Early definitions of quality focused on product quality, defined as fitness for use fitness for purpose or simply conformity to requirement ('meeting specification'). The British Standards definition of quality is: 'the totality of features and characteristics of a product or service that bear on its ability to satisfy a given need.

### **2.23.1 Costs of quality**

The cost of quality is defined as: 'The cost of ensuring and assuring quality, as well as the loss incurred when quality is not achieved [14]. In other words, quality related cost includes both:

- The cost of appraisal and prevention activities, designed to try and minimize poor quality product entering the production process and/or reaching the customer.
- The cost of 'failure' : losses incurred because of poor quality products entering the production process and/or reaching the customer.

Appraisal costs are the costs incurred as part of the inspection process, in order to ensure that incoming materials and outgoing finished products are of the 'right quality'. Examples include: the cost of inspection processes and machinery, and quality audits.

Prevention costs are those incurred in order to reduce appraisal costs, by preventing or reducing defects or failures produced by the process. Examples include the cost of building quality into design and specifications; running 'quality circles' (quality problem-solving groups); and setting up defect prevention processes [6].

Internal failure costs are those that arise from quality failure, where the problem is identified and corrected before the finished product or service reaches the customer . Examples include: the scrapping or re-working of faulty items; re-inspection of re-worked products; the holding of contingency stocks (to allow for scrapped work and delays); and time and cost of activities required to investigate the causes of the failure.

External failure costs are those that arise from quality failure identified and corrected after the finished product or service reaches the customer. Examples include: the costs of 'reverse logistics' to collect and handle returned products; the costs of repairing or replacing defective products; the cost of customer claims for compensation; the administrative costs of handling complaints; the cost of lost customer loyalty and future sales; and reputational damage arising from 'word of mouth' by dissatisfied customers.

Since the costs of 'getting it wrong' are generally perceived as being higher (and further reaching) than the costs of 'getting it right', there has generally been an increased emphasis on quality management with the aim of getting it right first time'.

### **2.23.2 Quality assurance and Quality control**

There are a wide variety of techniques for managing supply and supplier quality; they generally fall into two basic categories or approaches: quality control (QC) and quality assurance (QA). Systems for the detection and correction of defects are known as quality control. This is an essentially reactive approach, focusing on:

- Establishing specifications, standards and tolerances (parameters within which items can vary and still be considered acceptable) for work inputs and outputs
- Inspecting delivered goods and monitoring production processes, often on a 'sampling' basis (Although 100% inspection' may be used on critical features, or where zero defects are required).
- Identifying items that are defective or do not meet specification
- Scrapping or re-working items that do not pass inspection and passing acceptable items on to the next stage of the process.

A quality control approach, based on inspection, has certain limitations:

- A very large number of items must be inspected to prevent defective items from reaching production processes or end customers. This ties up resources - and does not add value (or indeed improve' quality)
- Defective items may slip through without being spotted or even inspected, in unacceptable numbers, owing to budget and schedule pressures (especially if the buyer is operating a strategy of just in time supply).
- The process aims to identify and reject defective items once they have already been made. By this time, however, they may already have incurred significant waste & costs (of design, raw materials, processing, overheads and so on).
- Inspection activity tends to be duplicated at each stage of the supply process - magnifying the inefficiencies and wastes.

Systems for the prevention of defects are known as quality assurance. This is a more proactive and integrated approach, building quality into every stage of the process from concept and specification onwards. It includes the full range of systematic activities used within a quality management system to 'assure' or give the organization adequate confidence that items and processes will fulfill its quality requirements. In other words, quality assurance is a matter of 'building in quality' - not 'weeding out defects'.

The term quality management is given to all the various online and offline processes used to ensure that the right quality inputs and outputs are secured: that products and services are fit for purpose and conform to specification; and that continuous quality improvements are obtained over time. Quality management thus includes both quality control and quality assurance.

### **2.23.3 Total quality management (TQM)**

The term total quality management (TQM) is used to refer to a radical approach to quality management, as a business philosophy. TQM is an orientation to quality in which quality values and aspirations are applied to the management of all resources and relationships within the firm and throughout the supply chain in order to seek continuous improvement and excellence in all aspects of performance.

### **2.24 Preventive maintenance**

The purpose of maintenance is to optimize the performance of equipment by attempting to prevent breakdowns or failures. An understanding of the nature and purpose of maintenance regimes and schedules enables the operations manager to view production schedules with greater confidence as the incidence of delays or breakdowns in production will be reduced.

There is a close correlation between maintenance and quality as only those machines that operate within anticipated parameters will be able to deliver the required quality of product; without effective maintenance there will clearly be concerns relating to product quality.

Repair (or breakdown) maintenance is involved with failures and related problems as they occur. This is reactive in nature. The operations manager must have in place details with regard to guarantees, warranties or specialists to call on.

Preventive maintenance requires a proactive approach and is concerned with the reduction of failure by the implementation of a rigorous preventive regime. Preventive maintenance is defined as a system of daily maintenance, periodic inspection, and preventive repairs designed to reduce the probability of machine breakdown [15].

The primary reason for preventive maintenance is to reduce unexpected downtime and repair costs caused by machine breakdown. Preventive maintenance is largely precautionary and will be undertaken according to a predetermined and regular schedule.

Preventive maintenance plays an important role in operations management with benefits ranging from cost reductions and decreased downtime to safety and improved performance. It involves routine machine inspection, servicing, cleaning, and keeping accurate maintenance records.

### **2.25 Benchmarking**

Benchmarking is a business discipline that has been utilized over many years. It has gained widening appeal as technology has enabled comparable measures to be used, contrasted and

evaluated within tight time frames and with greater accuracy. Benchmarking is about comparing your organization with others to identify areas for improvement and putting in place systems and procedures to ensure effective delivery.

Other definitions of benchmarking illustrate the importance of benchmarking in a competitive world: the process of identifying, understanding and adapting practices from anywhere in the world to help your organization improve its performance.

Benchmarking aids an organization in its understanding of competitors and the methods by which they operate. They bring successful ideas from proven practice that can be adapted or built upon. With benchmarking more options become available as different approaches are introduced and these can help lead to superior performance over time. So, benchmarking can be used as a tool for finding cost reduction techniques and apply those techniques in an organization.

Benchmarking is a proactive approach that establishes credible goals and objectives enabling a considered understanding of real problems and issues supported by proven business responses.

## **2.26 Conclusion**

Cost has its different dimensions. The modern procurement and supply chain management depicts various strategies and approaches to reduce cost. Every organization has to deal with cost. Applying the effective and right cost reduction strategy can help to reduce the cost of an organization to a great extent and also help it achieve competitive advantage in the industry.



## Chapter 3: Data analysis and Discussion

### 3.1 Introduction

In this chapter the data achieved from primary and secondary sources have been analyzed and discussed.

### 3.2 Current financial condition of BR

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 a deficit.

The total operating revenue without considering the effect of Public Service Obligation (PSO) and Welfare Grant of Bangladesh Railway for the year 2014-2015 amounted to Tk.9, 354.60 million. After meeting the total operating expenses of Tk. 18,082.98 million, the net operating income for the year came to (-) Tk 8728.38 million [3].

On the other hand, Government paid an amount of Tk. 860.00 million and Tk. 393.57 million as PSO compensation and Welfare Grant respectively. As a result, the total operating revenue duly considering the effect of PSO and Welfare Grant for the year 2014-2015 amounted to Tk 10,608.15 million. So, after meeting the total operating expenses of Tk. 18.082.98 million, the net operating income for the year came to (-) Tk 7,474.83 million [3].

During 2014-2015 there was increase in average revenue per passenger as always passenger-kilometer as compared to those of 2013-2014. Revenue per passenger increased to Tk. 77.62 from Tk. 75.14 and revenue per passenger-kilometer increased to 57.92 paisa from 57.84 paisa i.e. 0.14%. Average Distance travelled by passenger was from 125.2 kilometers in 2013-2014 to 129.4 kilometers in 2014-2015 [3].

In goods traffic, there was increase in average revenue per ton as well as revenue per tone-kilometer. Average revenue per ton was increased by 20.48% from Tk. 565.00 in 2013-2014 to Tk. 680.74 in 2014-2015. Revenue per tone-kilometer was increased by 17.68% i.e. from 202.5 paisa in 2013-2014 to 238.3 paisa in 2014-2015. The average haul of freight traffic increased from 268.4 kilometers in 2013-2014 to 271.6 kilometers in 2014-2015 [3].

The total operating revenue without considering PSO and welfare grant for the year 2014-2015 amounted to Tk.9, 355.58 million as compared to Tk. 8,001.80 million in 2013-2014,

representing an increase of 16.91%. Passenger earnings in 2014-2015 amounted to Tk. 5,226.84 million, showing an increase of 7.10% as compared to the earning of 2013-2014 amounting to Tk.4,880.17 million. Other coaching (Parcel and Luggage) earnings in 2014-2015 was Tk. 184.84 million as compared to Tk 225.71 million in 2013-2014 representing an decrease of Tk. 18.11 %. Miscellaneous earnings showed an increase of 50.03% from Tk.1, 466.60 million in 2013-2014 to Tk. 2,200.03 million in 2014-2015.

The total operating expenses for the year 2014-2015 amounting to Tk. 18,082.98 million, exhibits an increase of 12.90% as compared to the working expenses of 2013-2014 amounting to Tk.16, 016.96.million. The operating ratio decreased over the previous year from 200.2% in 2013-2014 to 193.3% in 2014-2015 without considering the effect of PSO and Welfare Grant. The Operating Ratio becomes 170.5% in the year 2014-2015 if the effect of PSO and Welfare Grant is considered [3].

During the year 2014-15, net operating income of Bangladesh Railway amounted to a deficit Tk.872, 84, 00 Figures of total operating revenue, total operating expenses and net operating income are given below [3]:

(Taka in Thousands)

Year (July-June)	Total operating revenue (Taka)	Total Operating expenses (Taka)	Net operating Income (Taka)
2005-2006	444,27,53	960,17,03	(-)515,89,50
2006-2007	452,76,06	933,12,72	(-)480,36,66
2007-2008	561,64,41	1088,54,57	(-)526,90,16
2008-2009	625,35,28	1172,74,94	(-)547,39,66
2009-2010	566,30,42	1257,20,47	(-) 690,90,05
2010-2011	629,54,56	1491,81,94	(-)862,27,38
2011-2012	603,42,93	1567,11,56	(-)963,68,63
2012-2013	804,26,26	1562,38,14	(-)758,11,88
2013-2014	800,17,96	1601,69,64	(-) 801,51,68
2014-2015	935,45,84	1808,29,84	(-) 872,84,00

Table 3.1: Net Operating Income (Without considering PSO & Welfare grant); Source:  
Information book 2015, Bangladesh Railway

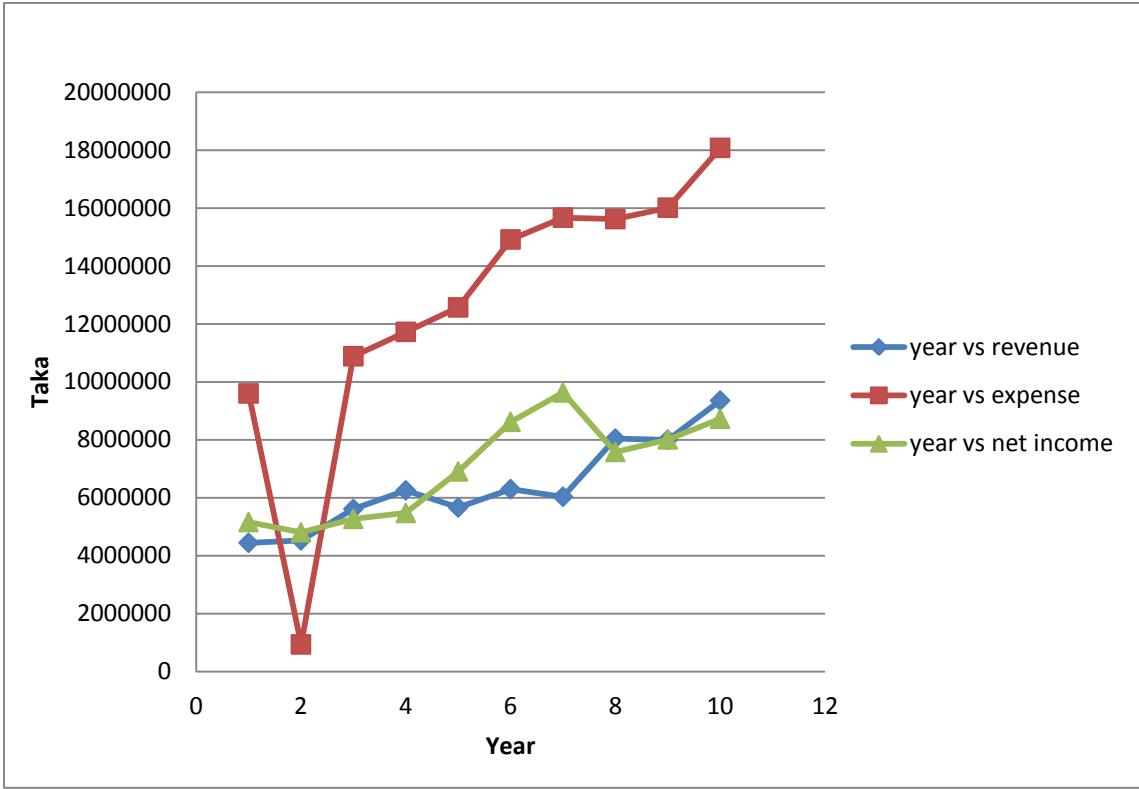


Figure 3.1: Operating revenue, expense and net operating income in different years

During the year 2014-15, net operating ratio of the Bangladesh Railway was 193.3%, i.e. total expenses were 193.3% of total earnings [3].

Year	Net operating ratio (%)
1969-70	83.4
2006-07	206.1
2007-08	193.8
2008-09	187.5
2009-10	222.0
2010-11	236.9
2011-12	259.7
2012-13	194.3
2013-14	200.2
2014-15	193.3

Table 3.2: Operating Ratio (without considering PSO and Welfare grant), Source: Information book 2015, Bangladesh Railway

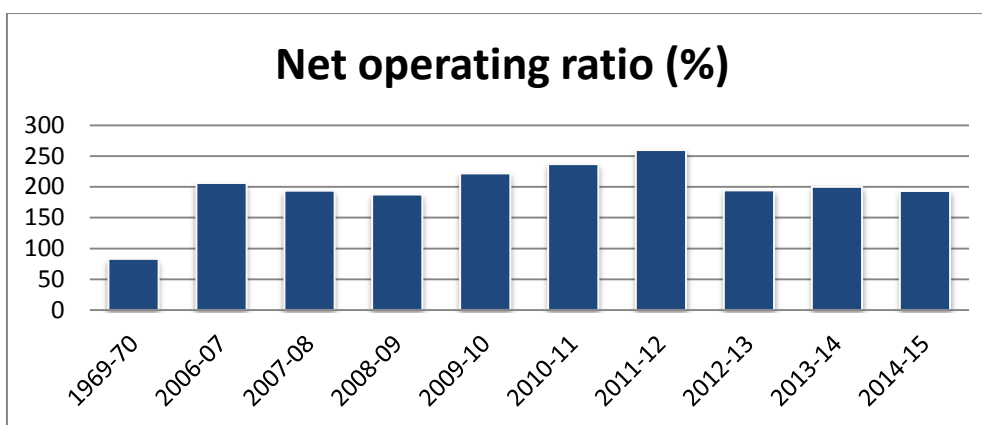


Figure 3.2: Net operating ratio of BR in different year

During the year 2014-15, net operating income worked out to Tk. 747,48,30 duly considering the compensation paid by the Government to the Railway for the loss incurred for operating service which fall under the public service Obligation (PSO) of the Government and Welfare Grant paid by the Government for education and health services to the Railway staff which do not constitute operating expenses. Such payments by the Government started from 1992-93. Since no depreciation was charged, the Operating Ratio is reduced to working Ratio. Year wise position is indicated below [3]:

(Taka in Thousands)

Year	Public Service obligation compensation	Welfare grant	Total operating revenue	Total operating expenses	Net operating income	Net operating income
	Taka	Taka	Taka	Taka	Taka	%
1998-99	86,00,00	14,93,61	451,84,33	433,36,42	(+) 18,47,91	95.9
2006-07	86,00,00	16,48,19	555,24,25	933,12,7	(-) 377,88	168.1
2007-08	86,00,00	26,61,12	674,25,53	1088,54,59	(-) 414,29,04	161.4
2008-09	86,00,00	26,5745	737,92,73	1172,74,94	(-) 434,82,21	158.9
2009-10	86,00,00	20,85,78	673,16,20	1257,20,47	(-) 584,04,27	186.8
2010-11	86,00,00	31,52,46	747,07,02	1491,81,94	(-) 744,74,92	199.7
2011-12	86,00,00	36,99,55	726,42,48	1567,11,56	(-) 840,69,08	215.7
2012-13	86,00,00	39,06,94	929,33,20	1562,38,14	(-) 633,04,94	168.1
2013-14	86,00,00	35,89,75	922,07,71	1601,69,64	(-) 679,61,93	173.7
2014-15	86,00,00	39,35,70	1060,81,54	1808,29,84	(-) 747,48,30	170.5

Table 3.3: Net Operating Income and Operating Ratio (Considering PSO compensation & Welfare grant), Source: Information book 2015, Bangladesh Railway

### 3.3 Quantitative data analysis: key findings

In the survey questionnaire [Annexure-A] quantitative data were obtained from respondents of different departments of BR. Questions were asked about their perception, idea on cost reduction approaches. These data are fully qualitative obtained from a limited group of respondents (which is not more than 25) and actual scenario may have some deviations from the obtained result.

In question no 1 the key respondents were asked about their idea of BR having any cost reduction strategy like “cost leadership” to reduce cost. In response to this question 100% of the respondents have given their opinion that Bangladesh Railway does not have this type of strategy.

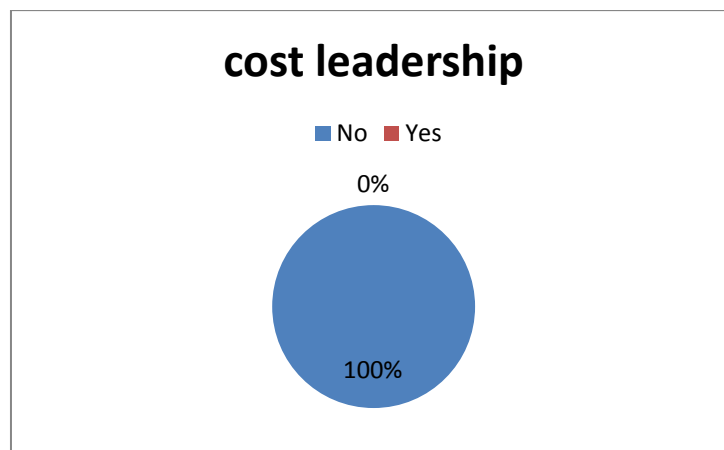


Figure 3.3: Opinion about cost leadership strategy; Source: Author’s Field Work

In question 2 the key respondents were asked whether Value Engineering is an effective way of cost reduction. In response 48% said yes, 44% said they have never heard of value engineering and 8% said no.

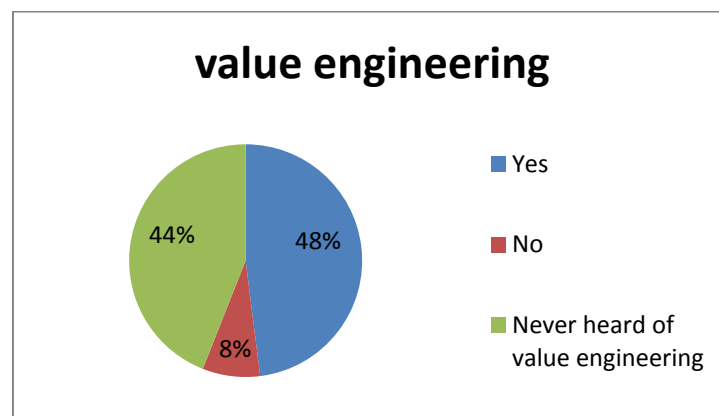


Figure 3.4: Opinion about Value Engineering; Source: Author’s Field Work

In question 3 the key respondents were asked whether they calculate the total cost of ownership during the purchase of a capital asset. 100% of them said they do not consider the total cost of ownership during procurement of capital asset.

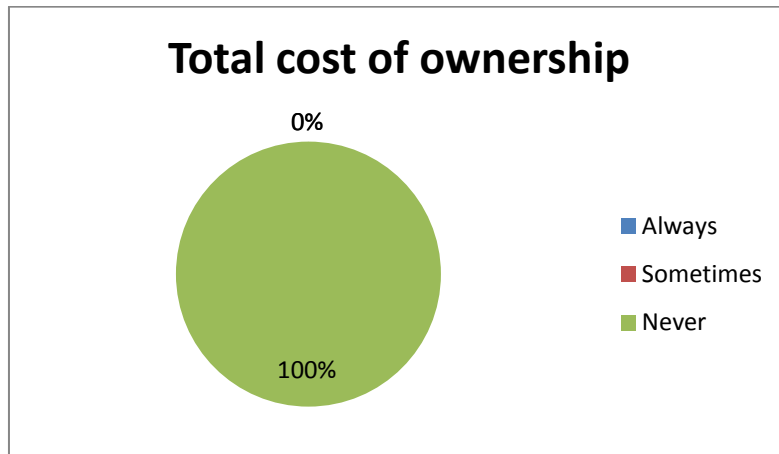


Figure 3.5: Opinion about total cost of ownership; Source: Author's Field Work

In question 4 the key respondents were asked whether the application of ICT can reduce cost of BR. 96% of them said that application of ICT would reduce cost and 4% disagreed.

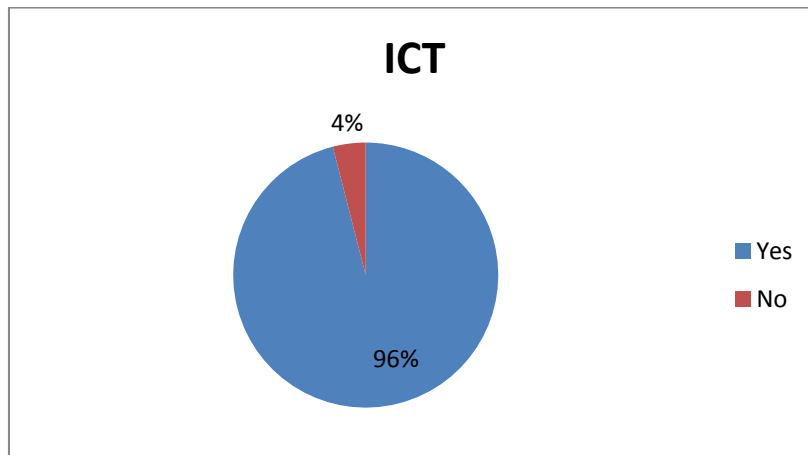


Figure 3.6: Opinion about ICT; Source: Author's Field Work

In question 5 the key respondents were asked about their perception of introducing e-procurement in BR. 56% of them said it would both save time, cost and ensure transparency. 20% respondents opined that it would save time and reduce cost. 24% said that it would ensure transparency.

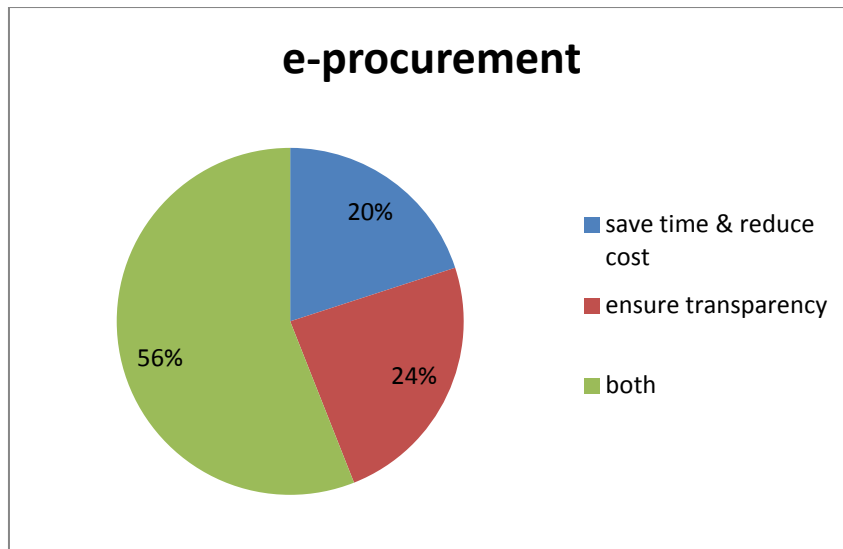


Figure 3.7: Opinion about e-procurement; Source: Author’s Field Work

In question 6 the key respondents were asked whether BR could MRP & ERP software for effective production planning and inventory control to reduce cost. 28% said yes, 32 % disagreed and 40% said implementation of this software in BR would be very tough.

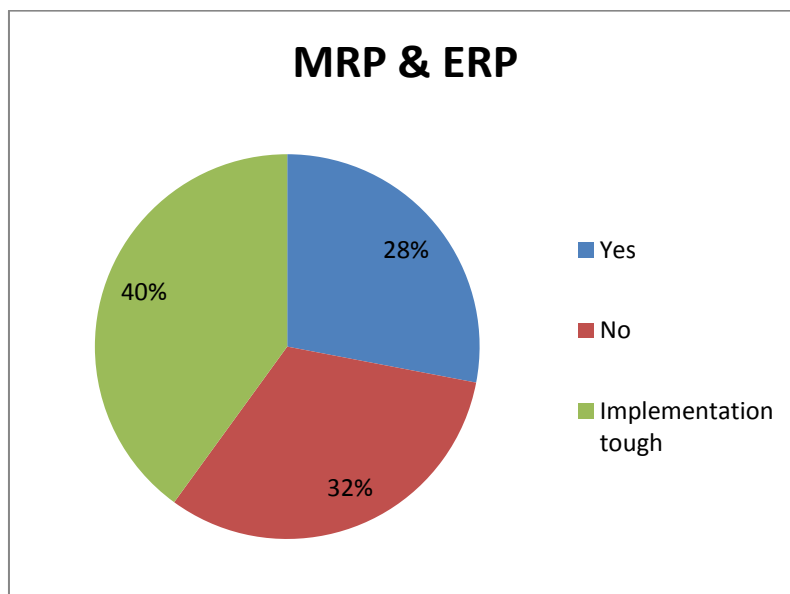


Figure 3.8: Opinion about MRP & ERP; Source: Author’s Field Work

In question 7 the key respondents were asked to mention the percentage of e-procurement that they have implemented in the last fiscal year. The result is 0% i.e. none of them have implemented e-procurement in the last fiscal year.

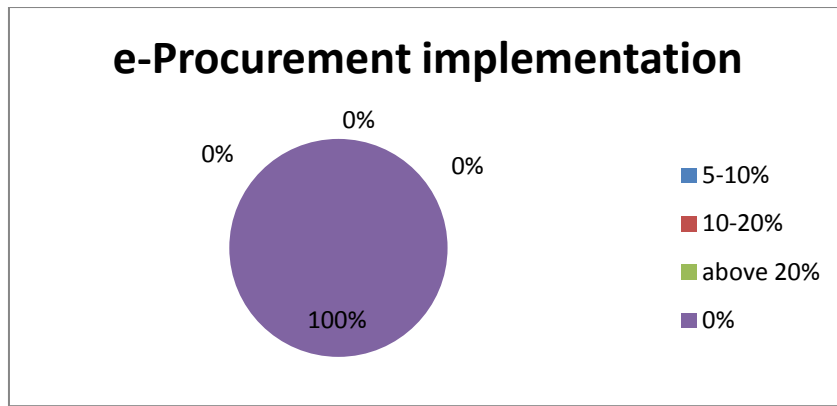


Figure 3.9: Opinion about e-procurement implementation; Source: Author’s Field Work

In question 8 the key respondents were asked to suggest the better approach between quality control and quality assurance for cost efficiency. 44% suggested quality assurance and 56% quality control.

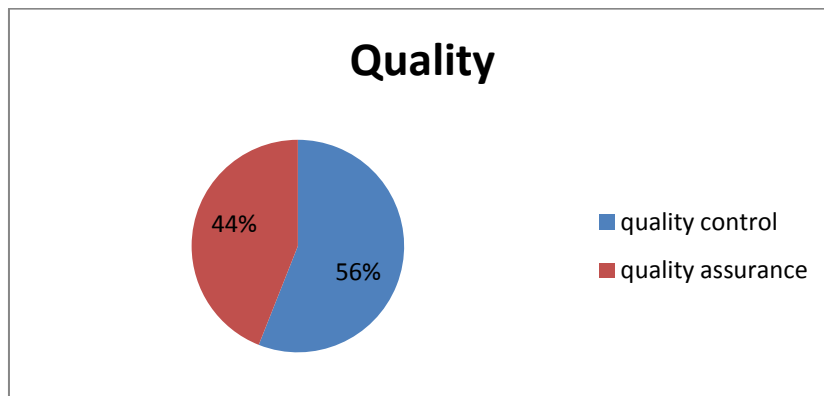


Figure 3.10: Opinion about quality; Source: Author’s Field Work

In question 9 the key respondents were asked whether they consider cost of quality in operation, maintenance and procurement. 20% said sometimes they consider and 80% never consider.

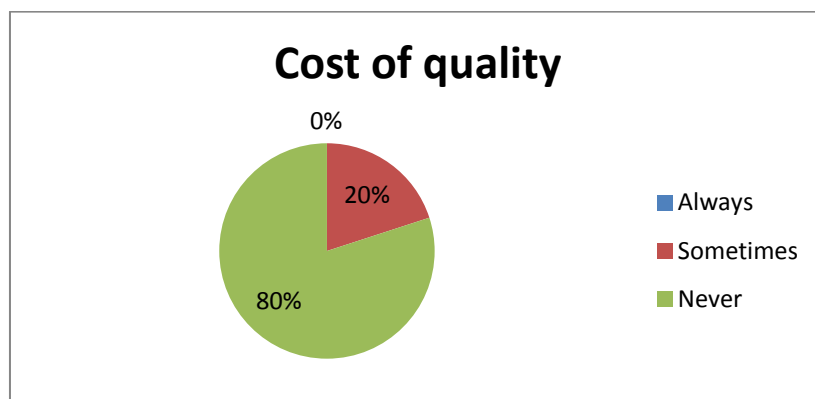


Figure 3.11: Opinion about cost of quality; Source: Author’s Field Work



In question 10 the key respondents of mechanical department were asked whether they practice Lean Supply approach in the workshop. 4% said sometimes they practice, 28% never practice and 68% have little idea about lean supply.

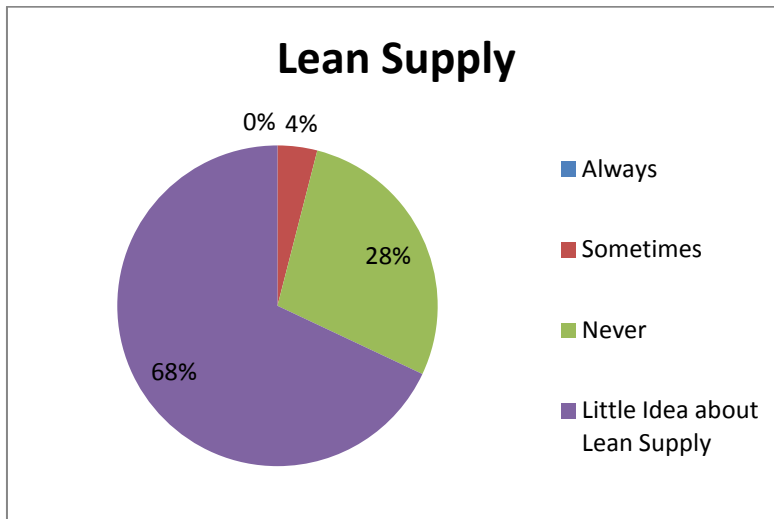


Figure 3.12: Opinion about Lean Supply; Source: Author's Field Work

In question 11 the key respondents were asked whether they think JIT would be effective for reducing cost in BR. 40% agreed, 12% disagreed and 48% have little idea about JIT.

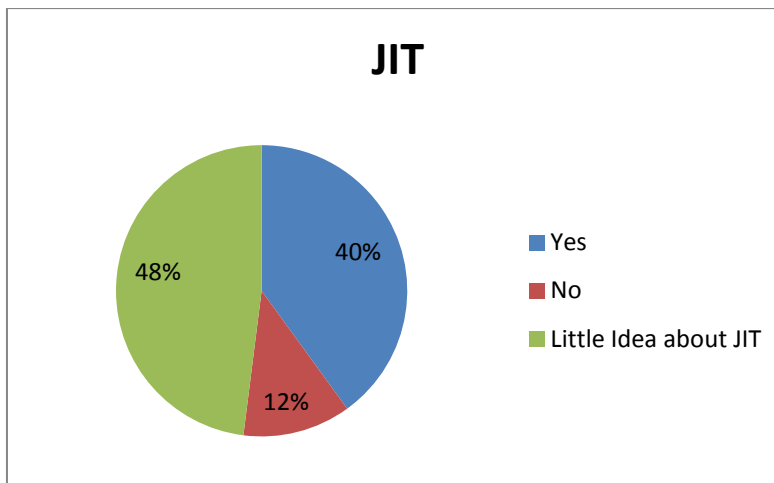


Figure 3.13: Opinion about JIT; Source: Author's Field Work

In question 12 the key respondents were asked whether standardization and variety reduction would reduce cost of BR. 96% answered positively and 4% disagreed.

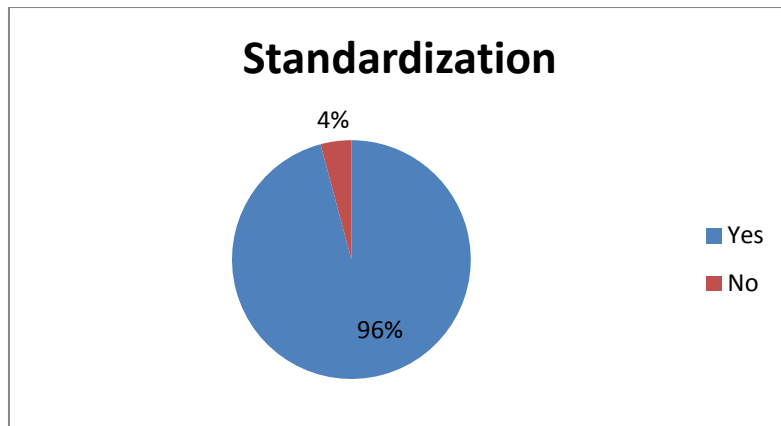


Figure 3.14: Opinion about standardization; Source: Author’s Field Work

In question 13 the key respondents were asked whether they practice consortium procurement approach for economies of scale. 72% said the never practice it, 28% said they have little idea about consortium procurement.

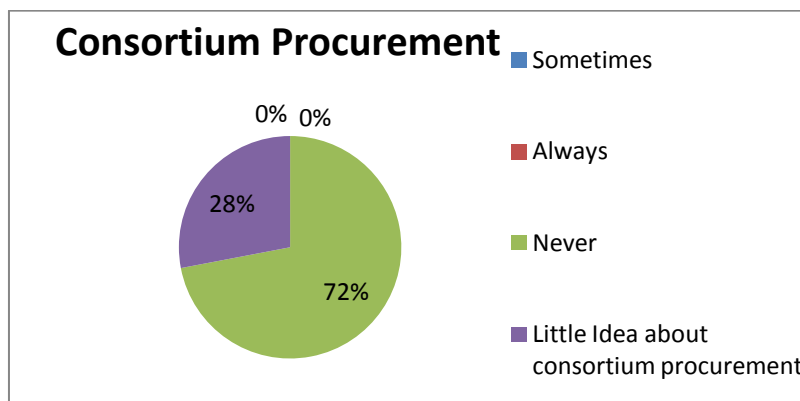


Figure 3.15: Opinion about Consortium procurement; Source: Author’s Field Work

In question 14 the key respondents were asked whether outsourcing of non core activities can save time and cost. 80% said yes and 20% said no.

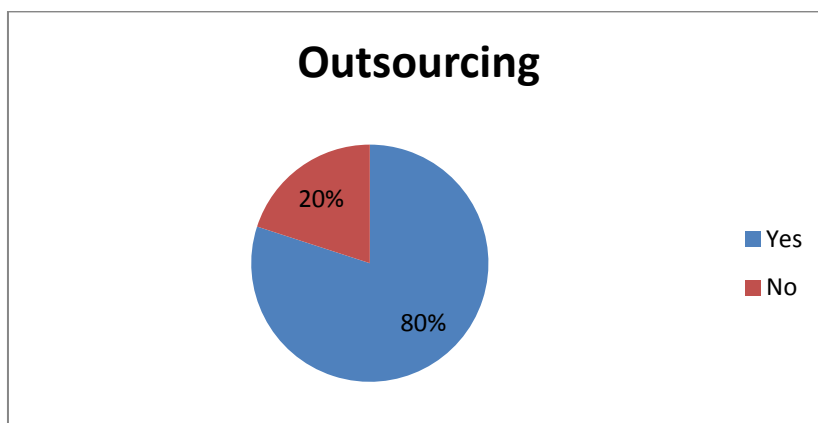


Figure 3.16: Opinion about outsourcing; Source: Author’s Field Work

In question 15 the key respondents were asked to mention the non core activities that they have outsourced. Only respondents from mechanical and traffic & commercial department said that they have outsourced some cleaning and onboard train service.

In question 16 the key respondents were asked whether effective preventive maintenance would reduce downtime and failure cost. 100% of them said yes.

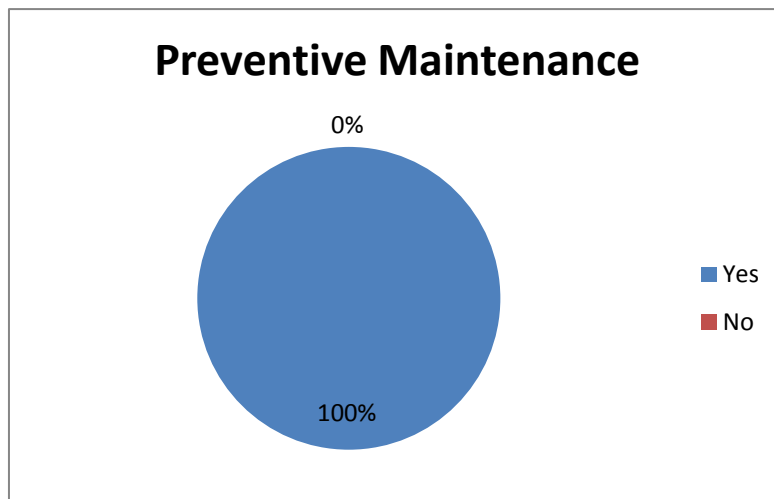


Figure 3.17: Opinion about preventive maintenance; Source: Author's Field Work

In question 17 the key respondents were asked whether they have benchmarked their functional activities in order to find their cost efficiency status. 100% of them said that they have never benchmarked their activities for performance measurement.

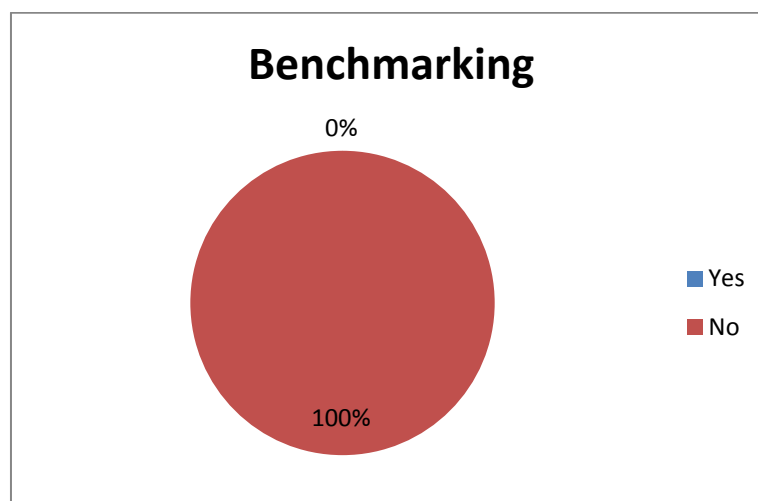


Figure 3.18: Opinion about benchmarking; Source: Author's Field Work

In question 18 the key respondents were asked whether all the departments of Bangladesh Railway have goal congruence. 16% said yes, 48% of them said no and the rest 36% said that the departments are dysfunctional.

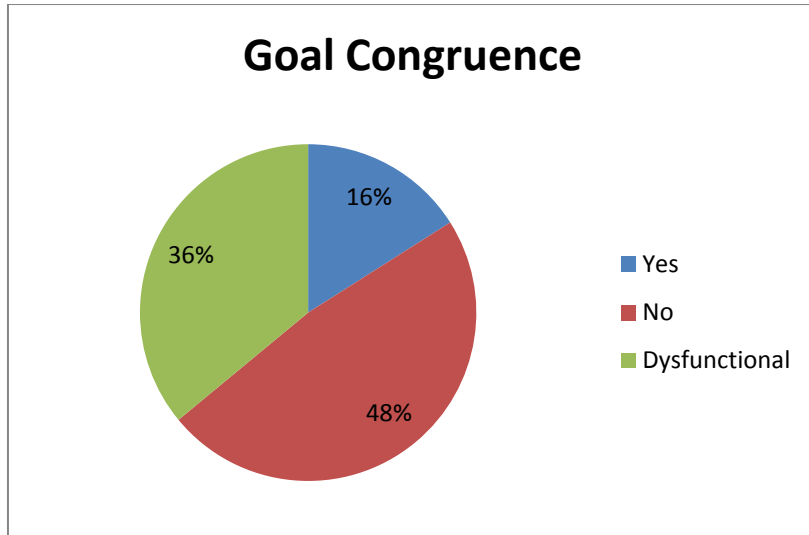


Figure 3.19: Opinion about goal congruence; Source: Author’s Field Work

In question 19 the key respondents were asked about their perception on achieving value for money in Bangladesh Railway. 48% said it is low, 12% high and 40% said average.

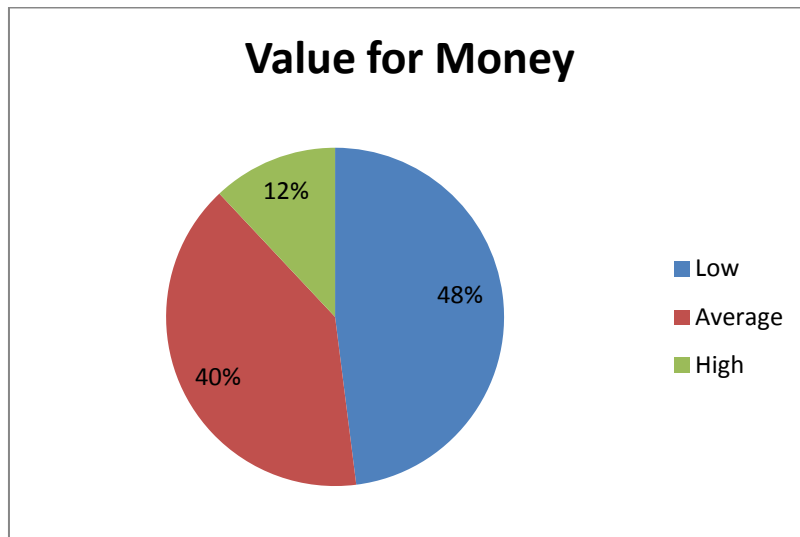


Figure 3.20: Opinion about value for money; Source: Author’s Field Work

In question 20 the key respondents were asked to mention their perception of cost efficiency of Bangladesh Railway. 4% said it is high, 52 % said it is low and the rest 44 % it is average.

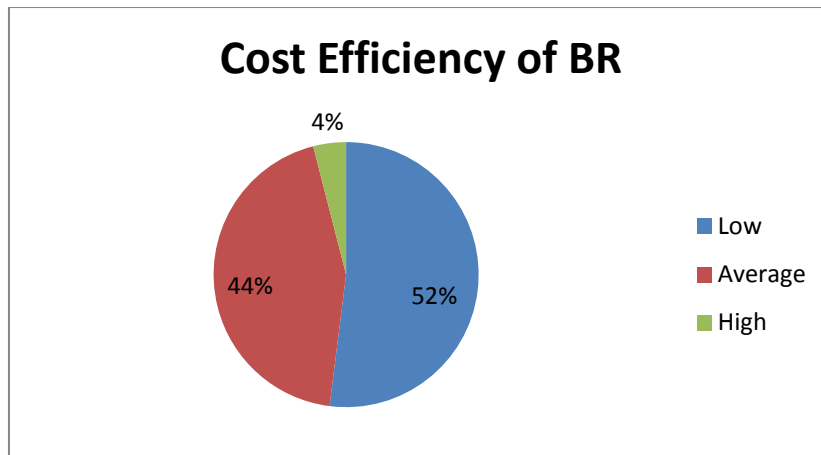


Figure 3.21: Opinion about cost efficiency of BR; Source: Author’s Field Work

### 3.4 Challenges of implementing cost reduction approaches

The survey questionnaire was used to explore the associated challenges of implementing cost reduction approaches in BR. A list of challenges was provided for convenience of the respondents. A relative marking based on the significance of the challenge was obtained from the respondents.

The challenges found are:

- Lack of performance measuring initiative like KPI, Vendor rating, etc
- Lack of standardization specially in Rolling Stock department
- Lack of ICT application
- Corruption
- Cultural resistance
- Silo mentality of the different departments of BR
- Lack of training
- Lack of expert manpower to implement the strategies
- Lack of knowledge
- Absence of specific cost reduction strategy in the highest level of BR

The weighted average of the relative marking was calculated and it is found that Absence of specific cost reduction strategy in the highest level of BR, Corruption, Lack of ICT application, lack of standardization in the Rolling Stock department would be the most significant challenges to implement the cost reduction strategies identified by the respondents.

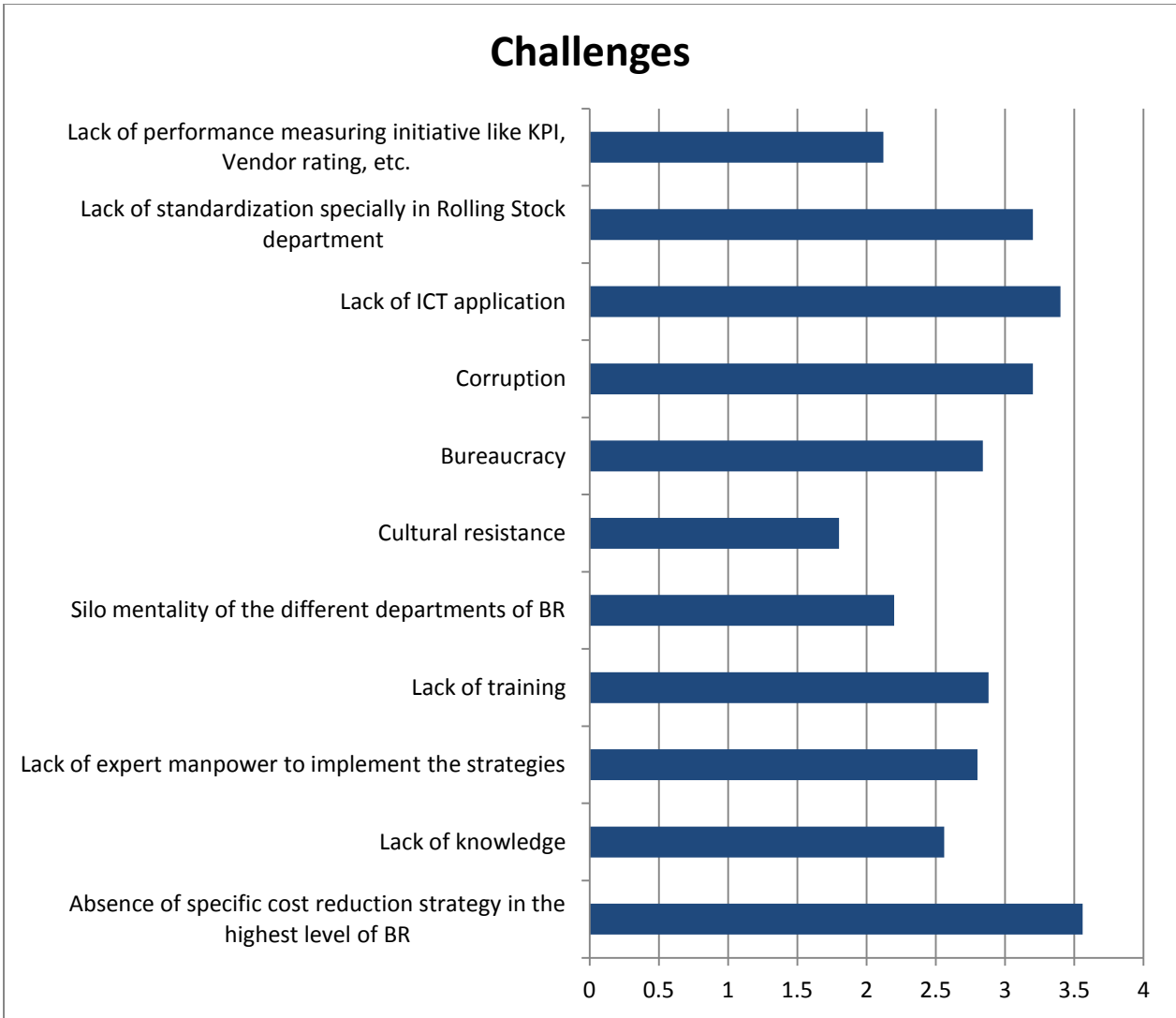


Figure 3.22: Challenges of implementing cost reduction approaches and their significance;

Source: Author’s Field Work

### 3.5 Conclusion

In this chapter an effort was made to find out the present status of Bangladesh Railway regarding cost reduction approaches and strategies. Data found from the survey questionnaire were analyzed here. It also provided the typical challenges that railway would face to implement cost reduction strategies. Due to time constraints the numbers of respondents were limited. So, with larger scope of research area and increased number of respondents the result of the analysis would have been more accurate.

## **Chapter 4: Conclusions and Recommendations**

### **4.1 Conclusions**

A main objective of this study has been to explore the modern approaches of procurement and supply chain to reduce cost of Bangladesh Railway, increase efficiency and ensure value for money. The conclusions include the author's view of BR's present cost reduction initiatives. As the results have indicated in this study, BR has to go a long way in order to reduce its cost and achieve value for money. Based on the survey questionnaire and analysis of secondary data the following conclusions can be made regarding the specific research objectives of the study:

#### **4.1.1 Present status of Bangladesh Railway**

- Net operating income of Bangladesh Railway is negative for years which mean operating cost is much higher than revenue generation.
- Cost effectiveness and achievement of value for money is quite low in Bangladesh Railway.
- Bangladesh Railway is the state owned only rail transportation service providing organization in the country. This is some kind of monopoly business in the country as BR does not have to compete with other organizations providing rail services. Lack of competitive pressure plays a negative role to formulate a clear cut cost reduction strategy in the highest level of BR. As a result all the functional departments of BR also do not have specific cost reduction strategies or targets.
- There is clear indication that BR's workforce has problems about understanding the different cost reduction approaches of procurement and supply chain.

#### **4.1.2 Approaches that could achieve cost efficiency in BR**

- Introduction of ICT, e-procurement, out sourcing non core activities, lean culture, quality assurance, standardization and variety reduction, value engineering concept, effective preventive maintenance, etc. could be some good approaches to achieve cost efficiency in Bangladesh Railway

#### **4.1.3 Associated challenges of implementing cost reduction approaches**

- Absence of specific cost reduction strategy in the highest level of BR
- Corruption and lack of ICT application

- Lack of standardization in the Rolling Stock department
- Lack of expert manpower, training, cultural resistance, etc.

## **4.2 Recommendations**

There are challenges to implement the cost reduction strategies in Bangladesh Railway. There are some recommendations to overcome these challenges. They can be implemented in two levels: One in the top most policy level and other in the functional level.

### **4.2.1 Policy level**

From the survey questionnaire it is evident that BR has no specific cost reduction strategy to ensure value for money. So, a specific, clear cost reduction strategy like “cost leadership” may be adopted at the highest level of the organization and the functional activities of all the departments should be aligned with this strategy. All stakeholder of different level of BR should be consulted with the strategy to be implemented for achieving value for money and cost reduction. The higher level policy making authority should cascade down the strategies towards all the functional departments. Proper leadership at the top policy level is required to achieve this strategy. Here proper leadership means a leader with vision, motivating qualities, communicative attitude, honesty and transparency and ability to inspire the whole organizational workforce towards goal.

### **4.2.2 Functional level**

Functional level is the level where the strategy adopted by the top level is being carried out. Extensive training should be carried out so that BR workforce is familiarized with the techniques and approaches of cost reduction of supply chain. Knowledge management program like coaching, training, mentoring, technology transfer, familiarizing the strategies of the top level with all the stakeholders of functional level, etc. should be carried out. Implementation of Information and communication technology is a must to achieve cost efficiency. It would also reduce corruption and ensure transparency. Cross-functional activities should be increased breaking the traditional functional silos. Establishing cultural change by TQM, Lean culture, increasing operational efficiency by performance measurement, benchmarking, etc. should be implemented.



### **4.3 Suggestions for further study:**

This study was carried out within a short period of time. The number of respondents i.e. the sample size was small. So there is scope for further study in this research topic to fine tune the research findings. A few suggestions for further study are:

- Further study can be carried out considering extended period of time and sufficient number of respondents so that more accurate result may be obtained.
- Benchmarking between Bangladesh Railway and other government organizations like RHD, PWD, DPHE, etc. can be carried out to compare the cost efficiencies of these government organizations.
- This study was an explorative type based on qualitative approach. Research can be carried out with other different types of research methodologies.

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## **Annexure-A**

BRAC Institute of Governance and Development (BIGD), BRAC University

### Survey Questionnaire

Research Topic: Exploring cost reduction approaches and associated challenges towards value for money for the Bangladesh Railway

Dear respondent, a very good day to you. I have been doing a research titled “Exploring cost reduction approaches and associated challenges towards value for money for the Bangladesh Railway”. This research is a part of requirement of —Masters in Procurement & Supply Management program under BRAC Institute of Governance and Development, BRAC University. The aim of this research is to find some approaches that could reduce the cost of BR, find out the challenges to ensure value for money and suggest the probable solutions for which your expert opinion would be valuable.

The information you provide will be used absolutely for academic purpose. Participation in this study is voluntary, and, you are free to withdraw at any stage. Furthermore, all information you provide is confidential, and, in no way will personally identifiable information be made available without your knowledge and consent.

Part A: You and your experience

1. Name :

2. Job Title :

3. Present Position:

- a. Senior Level
- b. Mid Level
- c. Junior Level

4. over all Experience:

- a. 0-5 years
- b. 6-10 years
- c. 11-15 years
- d. 15+ years

Part B: Opinion about cost reduction approaches and achieving value for money in Bangladesh Railway. Please provide your candid opinion regarding the following question.

1. Do you think Bangladesh Railway has any sorts of strategy like “cost leadership” to reduce cost and achieve value for money?
  - a. Yes
  - b. No
2. Do you think “Value Engineering” may be an effective approach to reduce cost?
  - a. Yes
  - b. No
  - c. Never heard of “Value Engineering”
3. Do you calculate the “total cost of ownership” during the purchase of a capital asset?
  - a. Always
  - b. Sometimes
  - c. Never
4. Application of ICT can reduce cost and increase operational efficiency. Do you agree or not?
  - a. Yes
  - b. No
5. What is your perception about introducing e-procurement process in BR?
  - a. It will save time and reduce tendering cost
  - b. It will ensure transparency
  - c. Both a & b
6. Do you think BR can use MRP & ERP software for effective production planning and inventory control and thus reduce cost?
  - a. Yes
  - b. No
  - c. Implementation of MRP & ERP will be very tough in BR
7. Please mention the percentage of e-procurement that you have implemented in the last FY:
  - a. 5-10%
  - b. 10-20%
  - c. Above 20%
  - d. 0%

8. Which of the following approach is more effective for cost efficiency?
  - a. Quality control
  - b. Quality assurance
9. Do you ever consider the “Cost of Quality” concept in operation, maintenance and procurement?
  - a. Always
  - b. Sometimes
  - c. Never
10. Do you practice “Lean supply” approach in your workshop (for mechanical department and stores department)?
  - a. Sometimes
  - b. Always
  - c. Never
  - d. Have little idea about lean supply
11. Do you think JIT approach will be effective for reducing inventory cost in BR?
  - a. Yes
  - b. No
  - c. Have little idea about JIT
12. Do you think standardization and variety reduction of spare parts will reduce time and cost in the procurement process?
  - a. Yes
  - b. No
13. Do you practice “consortium procurement” approach for economies of scale?
  - a. Sometimes
  - b. Always
  - c. Never
  - d. Have little idea about consortium procurement
14. Do you think outsourcing of non-core activities can save time and reduce cost, manpower?
  - a. Yes
  - b. No

15. Please mention the name of the noncore activity that you have outsourced (if any):
- a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
16. Do you think effective preventive maintenance of rolling stock, plants and machineries can reduce downtime and failure related cost?
- a. Yes
  - b. No
17. Have you ever benchmarked your functional activities in order to find your cost efficiency and for improving performance?
- a. Yes
  - b. No
18. Do you think Bangladesh Railway's all the departments have goal congruence?
- a. Yes
  - b. No
  - c. Most of them are dysfunctional
19. Please mention your perception about achieving Value for Money in Bangladesh Railway:
- a. Low
  - b. Average
  - c. High
20. Please mention your perception of cost efficiency in Bangladesh Railway:
- a. Low
  - b. Average
  - c. High

Part C: Challenges of Implementing cost reduction approaches in Bangladesh Railway.

In your opinion what are the challenges of implementing cost reduction approaches to achieve value for money (Please provide marks in a scale of 1 to 5 according to significance where 1 is for least significance and five is for most significance. Also mention any new ideas of your own. Some challenges are given for your convenience.)

Sr. no	Challenges	Scale
1	Absence of specific cost reduction strategy in the highest level of BR	
2	Lack of knowledge	
3	Lack of expert manpower to implement the strategies	
4	Lack of training	
5	Silo mentality of the different departments of BR	
6	Cultural resistance	
7	Bureaucracy	
8	Corruption	
9	Lack of ICT application	
10	Lack of standardization specially in Rolling Stock department	
11	Lack of performance measuring initiative like KPI, Vendor rating, etc.	
12		
13		
14		
15		

Thank you for your valuable time and sincere effort