

A Study on Warehouse Management of REB: A Case Study of Central Warehouse, Dhaka

**A Dissertation
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**Institute of Governance Studies
BRAC University, Dhaka, Bangladesh
March 2013**



*Dedicated
To
My loving parents
My beloved wife & daughter
and
My family members who supported me all the way.*

DECLARATION

I hereby declare that I am the sole author of this thesis.

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ABSTRACT

The Rural Electrification Board (REB) is a semi-autonomous government organization constituted under a government ordinance in 1977. It is primarily responsible for implementing countrywide rural electrification program to bring power to those living outside the main cities, the rural poor through Rural Electric Societies (Palli Bidhyut Samity- PBS) on the principle of co-operative. REB implements the programs of distributing power in rural areas by conventional electric grid system and renewable energy resources and to do this it constructs power distribution lines, sub-stations, install solar power plants and SHSs. Therefore, 90% of REBs total expenditure is spent for the procurement of equipments and materials required for construction and maintenance.

These materials need to be stored, managed and re-distributed as per requirement very efficiently and effectively where the warehouse function can play a vital role to add value to the supply chain. Primarily, these materials are stored in three central warehouses of REB. As a not for profit organization, the focus for REB is increasingly on reducing the operating cost to 'Delighting the Customer'. Stockholding policy (or physical storage & distribution) and warehouse management has a crucial role to in helping to deliver this objective.

Warehouses are usually large plain buildings used for commercial purposes for storage of goods and are commonly used by exporters, importers, wholesalers, manufacturers etc. Warehouses are crucial components of most modern supply chains and are likely to be involved in various stages of the sourcing, production and distribution of goods, from the handling of raw materials and work-in-progress through to finished products. As the dispatch point serving the next customer in the chain, they are critical to the provision of high customer service levels.

Warehouse management is concerned with ensuring that all the activities involved in warehousing are carried out efficiently and effectively by seeking to eliminate waste from activities that add cost to the supply chain, while maximizing those areas that add value. Every organization, regardless of size, has developed and implemented its own management concepts in order for it to run smoothly and accomplish the vision, goals and objectives it has set forth. In the context of warehousing, the basic functions of management could be broadly broken down into four major areas which allow for it to handle the strategic, tactical and operational decisions for the organization. The four functions or types of activities of warehouse management are: planning, organizing, leading and controlling.

This study is designed to explore the overall picture of warehouse management practice in REB and help identify the scope of improvements. To reach the said objectives, the study intends to use qualitative research model which was mainly based on primary data and some secondary sources were also used. In this regard, for primary data collection the study mainly used a combination of Key Informant Interviews (KIIs) and observation research methodologies. The combination of the stated methods is used for this study to take advantages of their respective strengths and overcome the limitations of others. Then secondary sources (includes books, articles, literary works, etc.) were also used to support the conclusion and recommendations made. The study found that, every year billions are spent for the procurement of equipment and materials required for construction and maintenance which are then stored in the central warehouses of REB and later distributed to other stores and project sites according to the requirements. But the warehouse management of REB has no specific long term vision and goals.

In addition, existing performance of Warehouse Management is not that much satisfactory in terms of efficiency and effectiveness in comparison with the present standards of similar industry. Therefore, based on the response of the respondents', observation and literature review problems are identified and conclusions are drawn. REB has not traditionally seen warehouse function as 'profit centre' rather considered as 'cost centre'. Hence, efficient and effective warehouse management has crucial roles to play for the organization and it can act as a profit centre for the organization. Warehouse Management provides maximum profitability with the minimum investment through ordering cost and carrying of materials. It provides service and controls function of the flow of materials entering and distributed at a company.

The study recommends some possible improvement in the key areas of REB warehouse management such as organization and management, warehouse and warehouse premises management strategy, security, health and safety, use of ICT, disposal of goods, annual procurement plan and training of personnel's. I believe that, if REB considers and implements those recommendations in warehouse management then existing performance of warehouse management at Central Warehouse, Dhaka would certainly improve which in turn can be implemented throughout REB to improve its overall performance regarding warehouse management.

In today's world warehouse management is considered as an indivisible part of all business. If effectively and efficiently organized and managed the REB warehouses could deliver safe custody of materials, clear monitoring and accountability, distribution of the right goods at the right time whenever required in the right condition to all user departments, maximum profitability with the minimum investment through ordering cost and carrying of materials. It provides service and controls function of the flow of materials entering and distributed at a company. In general, this study is expected to be helpful for the policy makers of REB to improve the existing performance of the REB Warehouse Management.

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ACRONYMS

ACRE	Area Coverage Rural Electrification
REB	Rural Electrification Board
SHS	Solar Home System
PBS	Palli Bidyut Samity

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Rural Electrification Board (REB) is a semi-autonomous government organization that is responsible for rural electrification in Bangladesh through conventional electric grid system and renewable energy resources. It implements the programs of distribution of power in rural areas and constructs power distribution line and power sub-stations through Rural Electric Societies (Palli Biddyt Samity- PBS) on the principle of co-operative. Every year almost 90% of REBs total expenditure is spent for material procurement which is primarily stored in three central ware houses of REB. As a no profit no loss organization, the focus for REB is increasingly on reducing the operating cost to ‘Delighting the Customer’. Stockholding policy (or physical storage & distribution) and warehouse management has a crucial role to play in helping to deliver this objective.

A warehouse is a commercial building for buffering and storage of goods, or an intermediate area for storage of raw materials or products until they are needed for production or consumption. Warehousing is an essential component for most businesses and government organizations. In any Supply Chain, Inventory Management and Warehousing form a part of operations intensive function and is one of the key building blocks in the entire chain and the efficiency of the warehouse operations will determine the further supply chain efficiency.

1.2 STATEMENT OF THE PROBLEM

The study intends to compare the present warehouse management practice at REB with industry best practices which will eventually identify the non-performing areas and limitations of warehouse management through the case study of the Central Warehouse, Dhaka. Therefore, the main objective of this study is to identify the scopes for improvements in REB’s warehouse management. In general, this study is expected to help the policy makers of REB to improving the existing performance of Warehouse Management.

Therefore, it can be understood that, this study aims to find out the answers of the following questions:

- How the central warehouse of REB is managed at present?
- What are the scopes of improvements?

1.3 RATIONALE OF THE STUDY

There are plenty of researches in this issue but a very little works have been done in Bangladesh context. Warehouse management in Western and Eastern societies may not be the same, because the culture is not same. Due to the nature of public and private organization, there will be a further difference in warehouse management practices in both the sectors. Therefore, it is necessary to make a study in Bangladesh viewpoint especially in the public sector organizations. Since REB is a semi autonomous government agency, studying its warehouse management practice will provide an overall generalized picture of warehouse management practice in public sector organizations of Bangladesh and help identify the scope of improvements in this sector.

1.4 METHODOLOGY

The main methodology for this study will be Key Informant Interviews (KIIS). Although a combination of KIIS, Observation and Literature Review will be used for this study. The combination of the stated methods is intended to use for this study to take advantages of their respective strengths and overcome the limitations of others.

Ultimately, a report has been prepared as per instruction given from the Institute of Governance Studies (IGS), BRAC University, Dhaka under the guidance of my supervisor Dr. Nazrul Islam, Professor & Dean, Faculty of Business Administration, Eastern University, Dhaka.

1.5 LIMITATIONS OF THE RESEARCH

Both the scope and methodology of this study may hinder the research quality. The limitation of this study is that, although REB has three Central Warehouses and each of them may have a separate set of warehouse management issues and limitations to be addressed, this study is only based on the case study of Central Warehouse, Dhaka and its present warehouse management practices. Scopes for improvements are identified and recommendations are also made accordingly.

The respondents were selected from Dhaka city only those were mainly available in the head office of the organization but not every office of the organization was included in this study.

Besides the interviews of warehouse manager and other staffs conducted at Central Warehouse, Dhaka. Besides that, most of the interviews were conducted in REB head office and few were conducted over phone.

On the other hand, officers were selected for the key informant interview (KIIs) on the basis of researcher's convenience. Suppliers (contractors) who were interested are selected only. During personal interview, respondents were requested to answer based on their own perception. For the reason, however, the perception might be different for different respondents, which might be a major limitation of this study. Besides, some of the respondents did not provide the required time for interview due to their preoccupation.

However, the time constraint for completion of the research was also one of the major limitations of the study to some extent.

1.6 OUTLINE OF THE RESEARCH WORK

The whole research work is presented in seven different chapters.

The first chapter is the introduction chapter; which gives an outline of the general background of the study. This chapter also explains the statement of the problem, rationale of the study, methodologies to be followed with the probable limitations.

The second chapter is the overview of REB as an organization, its background, vision, mission and objective, operation, organizational structure

The third chapter is the research methodology chapter; where an elaboration of the design of the research work is given including the methods of collecting data, population and population size, place of study and study period, and analysis tools used.

The fourth and fifth chapter is the literature review chapter; which give a generalized concept of warehouse and warehouse management basing on which this research work intends to be carried out.

The sixth chapter briefly describes the present warehouse management at REB based on the case study of Central Warehouse, Dhaka. This chapter gives an overall view of material management and warehouse management, planning, procurement, supplying, receiving the materials, coding and distributing the materials.

The seventh chapter is the analysis of the results chapter; which encompasses the interpretation of the data in the appropriate format using the analytical methods. This chapter also provides the results regarding existing performance of store management and finding out possible ways for improvement of the existing performance. In addition to these this chapter also provides the scope of further study in this topic.

CHAPTER 2

RURAL ELECTRIFICATION BOARD: AN OVERVIEW

2.1 INTRODUCTION

The Rural Electrification Board (REB) constituted under a government ordinance of 1977 and started functioning in 1978. It is primarily responsible for implementing countrywide rural electrification program to bring power to those living outside the main cities, the rural poor. It specializes in rural electrification and is also active in the field of diffusion of solar energy in rural Bangladesh.

REB sets forth the following major objectives in implementing the rural electrification program:

- o Ensure peoples participation in policy formulation in a democratic way.
- o Provide reliable and sustainable electricity to the rural people at affordable price.
- o Improve economic condition of the rural people by using electricity in agriculture, cottage and agro based industry.
- o Improve living condition of rural peoples.
- o Bring about entire rural Bangladesh under RE program or an area coverage basis.

The Rural Electrification Board has been providing service to rural member consumers for over 34 years. It operates on “no loss no profit” basis with a vision of “Electricity for all by 2020” and its mission is to provide “Quality and uninterrupted power supply” at grass root level in a democratic manner. Since its inception, the purpose of the program has been to use electricity as a means of creating opportunities for improving agricultural production and enhancing socio-economic development in rural areas, whereby there would be improvements in the standard of living and quality of life for the rural people.

Continued support from the Government of Bangladesh, the donor community, consulting partners, and member consumers will help this program continue to expand, providing the gift of electricity to millions more Bangladeshi households, businesses and industries.

2.2 HISTORY

Rural electrification was long before identified as one of the major components of overall infrastructure by the development plans of Bangladesh. It can definitely accelerate the pace of economic growth, employment generation, alleviation of poverty and improve living standard. A well planned and organizational rural electrification program was however, not existed till 1970s. Before REB, the electrification program was carried out by the Bangladesh

Power Development Board (BPDB) which was mainly limited to urban centers and at best to their peripheries.

At that time, the Government of Bangladesh engaged two consulting firms of USA to carry out a comprehensive feasibility study on rural electrification in Bangladesh. The firms studied all related issues in depth and put forward recommendation towards a sustainable and viable rural electrification program. In addition to the new institutional framework, the study emphasized for Area Coverage and Co-operative concept.

Based on this study, the Rural Electrification Board (REB) was established by the Government of Bangladesh (GoB) as a semi-autonomous government agency in late 1970's through REB ordinance.

2.3 GROWTH OF THE COMPANY

Rural electrification in a developing country like Bangladesh is a huge capital intensive program. In order to ensure the mobilization of fund and steady growth of the electrification program REB had taken a pragmatic plan to implement the gigantic task by phases. REB started functioning in early 1978 with the first project under the 1st phase undertaken for establishment of 13 PBSs in different parts of the country. Over the last twenty six years, more PBSs were organized in various phases which brings the current total at 70.

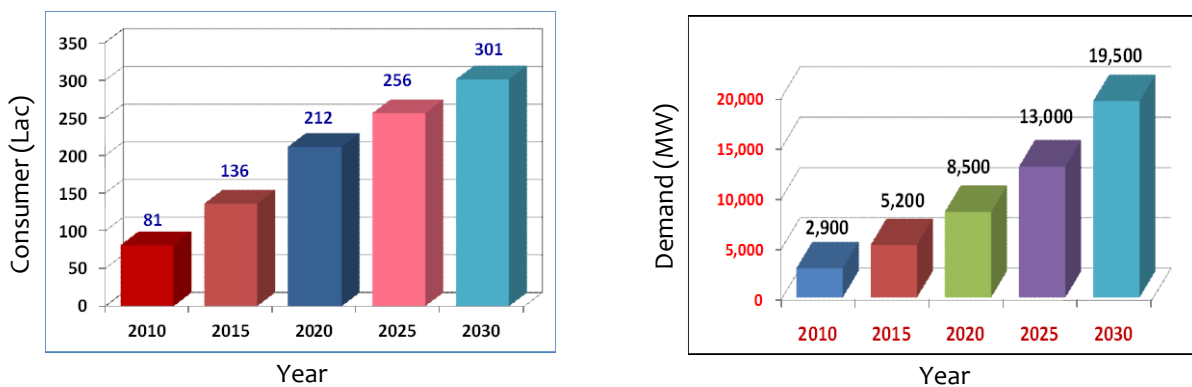


Figure 2.1 Consumer's Growth (Left) and Demand Forecast (Right)

The fifth phase of the Rural Electrification program is now under implementation. The REB is progressively assuming responsibility for areas formerly served by the BPDB and DESA. REB plans to cover all the village of Bangladesh by the year 2020 A.D.

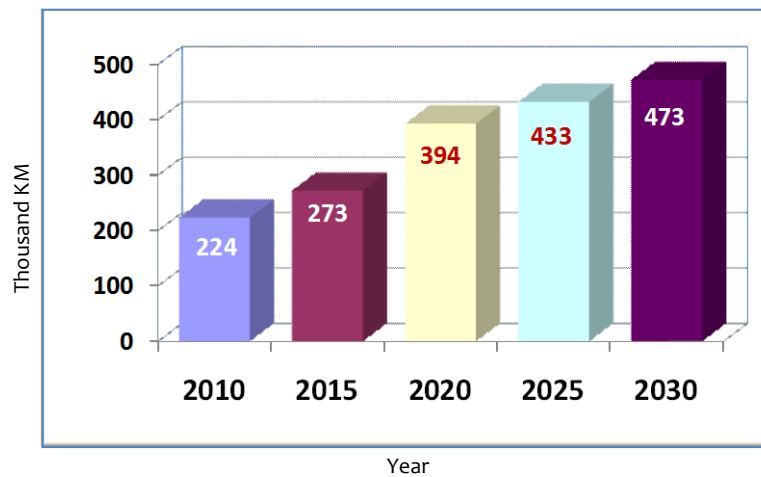


Figure 2.2 Line Construction Plan

As of December 2012, REB has included 433 upazilas under 70 operating rural electricity co-operatives called Palli Bidyut Samity (PBS)s through 61 different projects. REB has constructed 2,38,253 km of distribution line and 443 nos. 33/11 KV sub-stations to meet the approximate demand of 2900 MW for serving 92,28,709 nos. of different types of consumers in 49,190 nos. electrified villages. Besides, through the use of renewable energy sources especially solar energy, REB has installed 25,128 nos. SHS, 40 solar powered irrigation pump and several solar power plants cumulatively generating 2,075 kWp and has thus made immense contribution in increasing agricultural products and rural development (REB Website).

2.4 REB FUNCTIONS

The Board is a statutory Government organization reporting to the Ministry of Power Energy and Minerals Resources (MoPEMR). REB consists of a Chairman, four full time members appointed by the government and four part time members nominated from relevant departments.

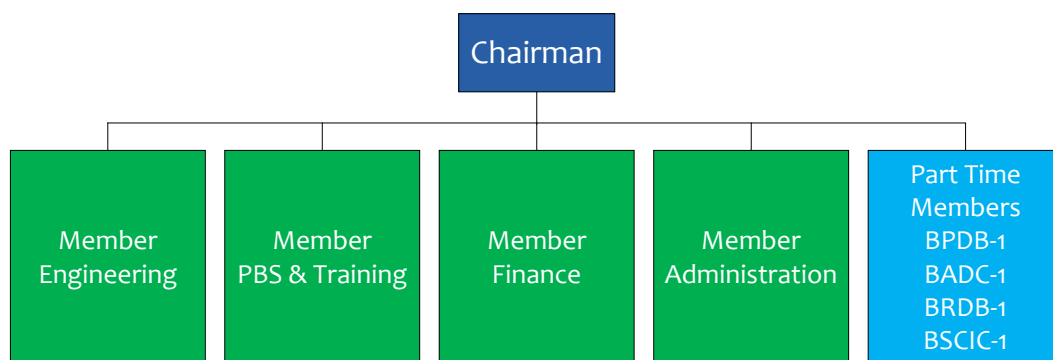


Figure 2.3 REB Board

The REB was established to implement the Area Coverage Rural Electrification (ACRE) Program based on the cooperative concept of RE. Some of the functions assigned to the REB were:

- Formation of PBS;
- Initial PBS organizing and development activities;
- PBS system design and construction of Sub-station & electric lines;
- Staffing and training of REB/PBS personnel;
- Developing funds, including relending program;
- Monitoring PBS operations and management activities;
- Providing liaison with the PDB, bulk power suppliers and other concerned Government agencies;
- Conducting Board of Director's election for PBSs;

In course of time, some additional functions are assigned to the REB to enhance its ability to achieve the goal of rural electrification more effective and efficiently. The functions are:

- Generation, transmission, transformation & distribution of electricity in rural areas;
- Effective use of electricity to foster rural development;
- Diffusion and promotion of renewable energy technologies;
- Submit project proposals and execute the approved projects;

For ensuring appropriate service level, service measurement and continuous improvement REB has set thirteen key performance indicators (KPIs) in areas such as system loss, accounts receivable, collection bill ratio, average training hour per employee, etc.

2.5 Management

Under the guidance of a nine member Board of Directors, the REB is run by a management team headed by the four fulltime members, with a view to run the organization effectively, efficiently and economically with optimum overhead cost and manpower. To carry out the functions assigned to it, REB has twenty six directorates of which three directorates operates directly under the Chairman, four under the Member (Administration), three under the Member (PBS & Training), four under Member (Finance) and rest twelve are under Member (Engineering). In between there are few high level officers such as executive director, controller of accounts and finance, chief engineer (project) and chief engineer (p & o) to carry out the supervisory activities.

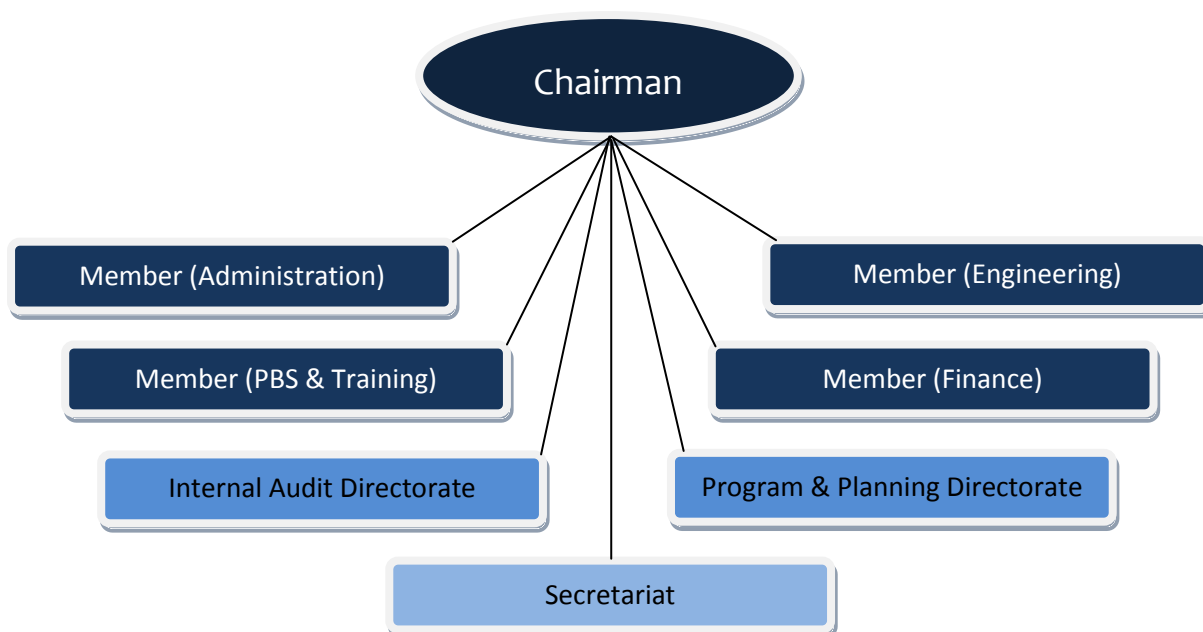


Figure 2.4 REB Organization Chart (REB Website)

REB delegates its activities in five zones namely Dhaka, Chittagong, Rajshahi, Khulna and Barishal Zone headed by Superintending Engineers to implement its field operational activities such as construction of the power distribution line and power sub-stations. Every zone is then sub divided to several Project Divisions headed by executive engineers. REB employs a total of 2016 employees (926 officers and 1090 staffs) to carry out the management & supervisory activities, desk jobs and field operational activities throughout the country.

Relative to the other distribution agencies, the REB has maintained a much superior level of accountability, in terms of system loss and bill collections. The system loss experienced by the REB has been consistently lower than for either the BPDB or DESA (now DPDC). (B.D. Rahmatullah, Nancy Norris and John Richards, 2008).

2.6 THE PBS

The duties of the REB are to initiate, formulate, administer and supervise a program of approved projects with respect to the distribution of electric energy in the rural areas of Bangladesh. It was determined that this could be best accomplished through the formation of member owned rural electric co-operative societies, with the REB acting as the banker, prime contractor and advisor to the rural electric societies (Fifth annual report to REB by NRECA).

The board established Palli Bidyut Samities (PBS), which is the Bengali name of the rural electric co-operative societies, to achieve the objectives of rural electrification program at the implementation level. It is a consumer owned entity organized on the basic principles of Co-operative for distribution of electric power to its members and other consumers. As per REB ordinance the Rural Electrification Board is the registering authority of a PBS.

It was patterned after one of the most successful public improvement efforts ever undertaken in the United States. It was done based on the model of Rural Electric Co-operatives in USA under the universal principle of co-operative, democratic, decentralization and ownership of consumers. PBS owns, operates and manages a rural distribution system within its area of jurisdiction. Each PBS is responsible for a geographical area of 1500 to 2000 square kilometers.

2.7 PBS MANAGEMENT

PBS is an independent corporate body subject to all applicable laws and prescribed Bye-Laws and is responsible for the efficient and effective management of its affairs including proper and successful construction, operation and maintenance of its electric distribution facilities as well as to take measures for effective use of electricity to foster rural development with special emphasis on increase of use of electric power for economic pursuits, such as development of agriculture and establishment of rural industries and assisting the disadvantaged sections of the community for augmenting their income and standard of living. As per Bye-Laws, the PBS shall at all times be operated on No Loss-No Profit basis for the mutual benefit of all its Members and non-members alike and is expected to repay all indebtedness on schedule.

A Board of Directors, which consists of not more than fifteen (15) Directors, administers the business and affairs of each Samity. No person can become or remain a Director unless he/she first becomes a bonafide member of the Samity. The Samity Board exercises all powers of the Samity except the Bye-Laws and the Electricity Act, 1910, with all amendments thereto or the PBS Bye-Laws, conferred or vested to the members of the Samity or reserved by the Rural Electrification Board. The Board have the following listed Office Bearers:

- o President
- o Vice-president

- o Secretary
- o Treasurer

The office bearers are elected by ballot each year by and from the members of the Board, at a meeting which is held immediately following adjournment of the annual meeting of Samity members. The Samity Board may provide for such other officers as may be determined necessary from time to time.

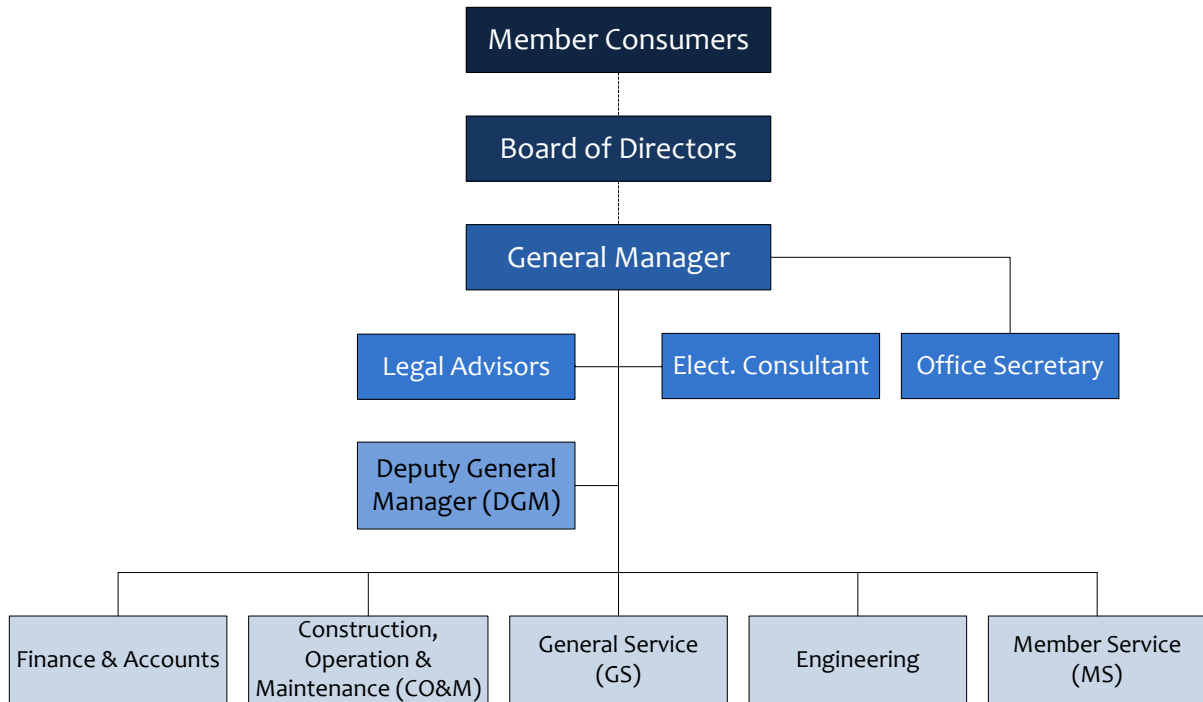


Figure 2.5 Functional Chart of PBS

Each PBS is headed by a General Manager. Under his/her direct supervision several DGMs, AGMs and other staffs work to carry out the management & supervisory activities, desk jobs and field operational activities throughout the country. There are more than 30,000 employees working in 70 PBSs throughout the country.

2.7.1 FUNCTION OF SAMITY BOARD

The Samity Board in addition to other duties and responsibilities as prescribed within these Bye-Laws performs or cause to perform the following functions:

- o Establish and maintain legal entity

- Generate, produce, manufacture, purchase, acquire, accumulate and transmit electric power and energy, and to distribute, sell, supply and dispose of electric power and energy to the Samity members, to Governmental agencies and others;
- Administer and guide the business and affairs of the Samity;
- Formulate plans, adopt policies, promulgate rules and Bye-Laws for the management, operations and conduct of the business affairs of a Samity;
- Fix retail rate charges for sale of electricity, subject to approval by the Rural Electrification Board;
- On behalf of the Samity, execute agreements, contracts, deeds and other legal documents with the Power Development Board, Autonomous or Semi-autonomous bodies, any person, organization or other bodies as deemed necessary and expedient, unless such powers have been reserved by the Bye-Laws of the Samity which assigned or delegated such powers to any other person.
- Organize board /special meeting & AGM
- Act as trustee
- Provide operating requirements
- Ensure legal right of consumers
- Mitigate employees-stakeholders conflicts

2.7.2 FUNCTION OF PBS

PBS is an autonomous organization which is private in nature, owned by the consumers and registered with REB. It operates on co-operative concept and the Functions of a PBS include:

- Consumer connections
- Purchase & sale of electricity
- Sub-station & line maintenance
- Consumer complaint handling
- Line extension
- Motivate consumers for safe use of electricity

The REB is the liaison between the PBS and government agencies: first, the Ministry of Power Energy and Mineral Resources; second, agencies that own and operate the electrical system in urban areas; third, government agencies, donors and NGOs engaged in rural development. The REB Board includes members from various agencies to facilitate this liaison in an effective manner. Right from the establishment of a PBS, REB assists the PBSs with:

- o Initial organizational activities.
- o Training of manpower.
- o Operational and management activities.
- o Procurement of funds.
- o Providing liaison between Bangladesh Power Development Board, Dhaka Electric Supply Authority (Bulk power supplies) and other concerned Government and Non-Government agencies.
- o Conducting election of PBS.

Financing for PBS infrastructure is organized through the REB. The need for infrastructure such as substations and distribution networks is assessed based on 20-year demand forecasts for the area. These are reviewed every year and updated every fifth year. Low interest long-term loans are issued with a grace period of eight years at 3 percent annual interest (B.D. Rahmatullah, Nancy Norris and John Richards, 2008).

2.8 CONCLUSION

Rural Electrification Board, over the past thirty four years, is dedicated to ensuring continuous growth and development in rural and suburban infrastructure, and has registered some very positive gains for the rural multitudes in respect to significantly increasing the rate of literacy, promoting health and family welfare, new employment facilities to rural men and women, increasing productivity both in farms and small & large industries and also help developing industrial habit hitherto unknown to the rural people. Continued support from the Government of Bangladesh, the donor community, consulting partners, and member consumers will help this program continue to expand, providing the gift of electricity to millions more Bangladeshi households, businesses, and industries.

Chapter 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research in fact is about collecting information that tells us about something and it helps us make informed decisions. In other words, it is a way of gathering data or information which we then organize in a coherent way, so that we can act or use it.

A basic research method is a more formal way of going about asking questions. We usually begin with something very specific we want to know. Then we ask the question or questions in a structured way. This structure is called a *methodology*. Knowledge of research methodology is useful in terms being able to apply the proper method to a certain project.

3.2 RESEARCH METHODOLOGIES

In research, there are a lot of different kinds of methodologies, and some of them can be very complicated. However, there are some basic ones that have been tried and tested, and which can be easily learned.

There are many different kinds of research. For example: market research, economic research, scientific research, media research, social research, etc. it could also be classified as primary research – study of a subject through first hand observation and investigation; and secondary research – involves the study of other researchers. Broadly speaking, there are two major types of research models: quantitative research and qualitative research. Within the context of qualitative research, few research methodologies are:

- Participatory Rural Appraisal (PRA)
- Participant observation
- Key informant interviews (KIIs)
- Focus group discussions (FGDs)
- Visual Methods
- Appreciative Inquiry (AI)
- Triangulation

Within the context of quantitative research, few research methodologies are:

- Visualizing qualitative data
- Correlation
- Experimental

Although many of these different kinds of research models have developed methodologies that are specific to their particular discipline, there are basic research methods that are common to most.

3.3 METHODS OF COLLECTING DATA

This study is designed to explore the overall picture of warehouse management practice in REB and help identify the scope of improvements. To reach the said purpose/objectives, the study intends to use qualitative research model which was mainly based on primary data and some secondary sources were also used.

In this regard for primary collecting data and information the study mainly used a combination of Key Informant Interviews (KIIs) and observation research methodologies. The combination of the stated methods is used for this study to take advantages of their respective strengths and overcome the limitations of others. Then secondary sources (includes books, articles, literary works, etc.) were also used to support the conclusion and recommendations made.

3.4 POPULATION AND POPULATION SIZE

It is quite understandable that officers, staffs, suppliers and customers who are directly or indirectly involved with the warehouse management of REB was interviewed for suggestions and improvements. A total of fifteen people (Appendix – F) were interviewed during the preparation of this report as the scope and time frame of the study was limited and we consider the case study of a single Warehouse.

The interviews mainly covered issues such as staff management (in terms of payment, expertise, deployment and other issues), management of stock (obsolete and redundant stock, stock proliferation etc), security concerns (vehicle security, warehouse security, personal security etc), storage system, warehouse design and layout, Information and Communication Technology used for Store Management and some other related issues.

3.5 PLACE OF STUDY AND STUDY PERIOD

Survey was conducted at different directorates of REB head office at Dhaka as and when appointment of the targeted person was available. In addition, the Central Warehouse, Dhaka was also visited and the personnel employed for management and day to day operation of this facility was interviewed to gather information. Some information also

obtained through observation. The study period was only a few months from June 2012 to December 2012.

3.6 Analysis tools used

Collected data have been cleaned, edited, and re-arranged for analysis and drawing a conclusion. No statistical analysis has been used as 100% of the sample is covered under the questionnaire survey. Microsoft Excel has been used for preparing tables; for calculation and for constructing pie charts. Microsoft Word has been used for preparing the report.

Eventually, a written report will be prepared as per instruction given from the Institute of Governance Studies, BRAC University under the guidance of Supervisor.

CHAPTER 4

RURAL ELECTRIFICATION BOARD: AN OVERVIEW

4.1 INTRODUCTION

This chapter describes the theories related to the research issues, which are relevant to the present thesis work. The theoretical framework for the thesis is briefly set up discussing all the important factors related to Warehousing and Warehouse Management. An extensive review of several key documents and literatures has done for this.

The purpose of this part of the thesis work is to set up a basis for theoretical frame of warehousing and its management concepts and investigate whether the technological advantages and the theoretical benefits are likely to create some impact on the efficiency of the REB central warehouses and also to find out whether they create some real added value for REB.

4.2 LOGISTICS

Logistics is defined by the Wikipedia as the “management of the flow of goods, information and other resources, including energy and people, between the point of origin and the point of consumption in order to meet the requirements of consumers”. It involves the integration of information, transportation, inventory, warehousing, material handling, and packaging.

Many scholars’ defined logistics in different ways in several literatures, which can be summarized as those activities that relate to receiving the right product or service in the right quantity, in the right quality, in the right place, at the right time, delivering to the right customer, and doing this at the right cost (The seven R’s). In most of the cases logistics is seen from the perspective of an operative way of transporting or moving materials from one point to another or producing service. The credibility of this operation is based on how good is the design of the system that leads to this kind of logistics.

According to the Logistics Management, council of Supply Chain Management Professionals (CSCMP, 2004), “Logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third party logistics services providers. Logistics management is an integrating function which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions, including marketing, sales, manufacturing, finance, and information technology.”

4.3 SUPPLY CHAIN MANAGEMENT

“Supply chain management is defined as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole” (Mentzer, 2001).

Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies. Supply Chain Management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, finance and information technology.

4.4 WAREHOUSE

The online Reference for Business has defined warehouse as “a storage facility that receives goods and products for the eventual distribution to consumers or other businesses”.

Warehouses are usually large plain buildings used for commercial purposes for storage of goods and are commonly used by exporters, importers, wholesalers, manufacturers etc. Warehouses or distribution center are usually equipped with loading docks to load and unload trucks and they have cranes and forklifts for moving goods, and are placed on ISO standard pallets loaded into pallet racks (See fig 4.1).

Warehouses are crucial components of most modern supply chains. They are likely to be involved in various stages of the sourcing, production and distribution of goods, from the handling of raw materials and work-in-progress through to finished products. As the dispatch point serving the next customer in the chain, they are critical to the provision of high customer service levels.

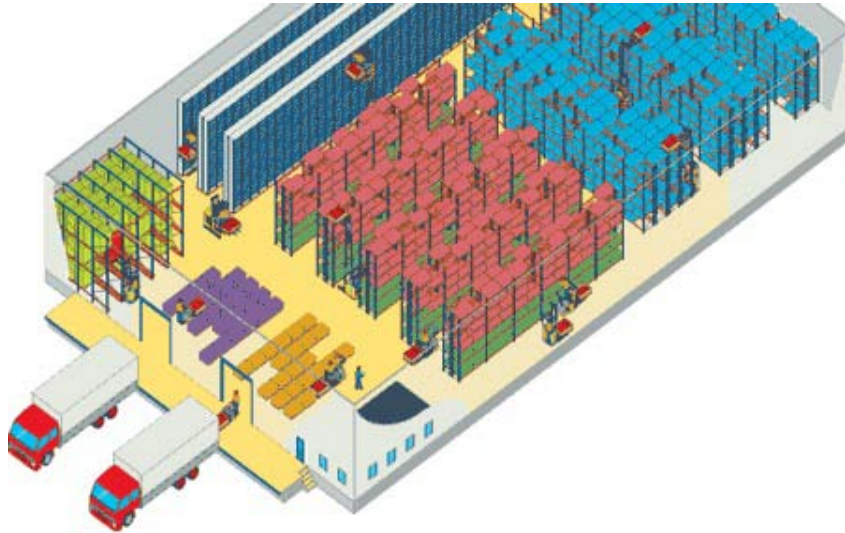


Figure 4.1 A Typical Warehouse Layout (Source: scmseeker.khazampc.com)

Some scholars have defined warehouse in different literatures as follows:

Warehouses are an integral part of the supply chains in which they operate, and therefore recent trends, such as increasing market volatility, product range proliferation and shortening customer lead times, all have an impact on the roles that warehouses are required to perform (Alan, R., Phil, C. and Peter, B., 2010).

A warehouse is “a commercial building for buffering and storage of goods, or an intermediate area for storage of raw materials or products until they are needed for production or consumption” (Chua & Teo 2008). Warehousing, being an essential component of logistics, is a key aspect of modern supply chains and plays a critical role in the success or failure of businesses today (Frazelle, 2002a).

4.4.1 HISTORY OF WAREHOUSING

In early days man used to store excess food and keeping animals for emergency surplus. The root of the warehousing concept goes back to the the creation of granaries to store food, which was historically available for purchase in the conditions of emergency such as famine, drought, etc. As the European explorers began to discover new shipping trade routes all over the world, the importance of warehouses grew for the storage of products and commodities, which were brought from far way places. The ports were the main locations of the warehouses, since majority of the trade between the countries was carried by ships.

As the civilization developed, local warehouses were introduced. Normally merchandise is stored in connection with shipping, trading, and manufacturing activities. During the Middle

Ages improvement in human knowledge gave rise to warehousing to handle the storage of shipped items. The first known major commercial warehouse was built in Venice, a centre of major trade routes.

In late 1800's in the United States, transportation between port cities and inland cities were effectively provided by railroad. Freight cars were used as warehouses on wheels, and were especially used in grain harvest season. Shortages in freight cars induced the railroad companies to partition the transportation and warehousing functions. As railroads began to expand travel and transportation, the creation of rail depots for the storage of materials became necessary.

In 1891 the American Warehousemen's Association was organized to challenge the railroad companies' control over freight depots. Commercial warehousing began to grow after the government placed more restrictions on railroads through Hepburn Act in 1906.

By the end of World War I, hand trucks were used for material handling in warehouses and stacking was done by hand, and stacking heights were designed in 8-to 12-foot range. World War II impacted warehousing in several ways, including the need to increase the size of warehouses and the need for more mechanized methods of storing and retrieving the products and materials. As mass production grew throughout manufacturing, the needs of efficient and effective warehousing capabilities grew with it. During this period, the forklift truck and wooden pallets were introduced. Stacking height of merchandise was increased to 30 feet, nearly a 300 percent increase due the mass production of forklift truck.

Warehousing systems have seen a continuous growth throughout the history, they have been moving forward from local storehouses during the middle ages to multimillion-dollar facilities. In 1960s and 1970s in the US automated warehousing meant automated storage/Retrieval systems (AS/RS) (Tompkins, Smith, 1998).

Now days some warehouses are fully automated where products are moved from one place to other with a system of automated conveyors and automated storage and retrieval machines which run by programmable logic controllers and also with logistics automation software. In an automated warehouse the tracking of materials is coordinated by warehouse management system (WMS), a database driven computer program. Logistics personnel make use of WMS to improve the efficiency of the warehouse by maintaining accurate inventory levels taking into consideration warehouse transactions and directing put ways.

4.4.2 THE PURPOSE OF WAREHOUSING

A warehouse is a commercial building used for the storage of goods. The most important element of warehousing is order processing which generally refers to the workflow coupled with delivering products ordered by a customer. The prime objective of most warehouses is to facilitate the movement of goods from suppliers through the supply chain to the end consumer while meeting the customers' demand in a timely and cost-effective manner.

In the old days of warehousing, inventory was seen to represent the wealth of a company. However, these days this is not the case anymore. Instead, many companies have noticed the high cost associated with holding inventory. In practice, however, there are overriding factors such as meeting customer demand and expectations that make it hard to operate without inventory.

Even though the new technologies in e-commerce, supply chain integration, quick response, just-in-time delivery and efficient consumer response that connect the manufacturing with the end customers, businesses are still struggling to eliminate the existence of a warehouse. Thus in order to meet the customer's requirements warehouse needs to be properly coordinated and maintained. (Cooper. J.C, Davis. Matthew, 1984)

Valid reasons for holding inventory include, for example, buffering cycles between two production processes, covering demand during supplier's lead-time, enabling savings by using volume discounts, coping with seasonal fluctuations, providing a variety of products in a centralized location, or holding anticipation and investment stocks (Krajewski & Ritzman, 2005). As a result, the basic aim of most warehouses is simply to minimize the total cost of operations while providing a desired level of service.

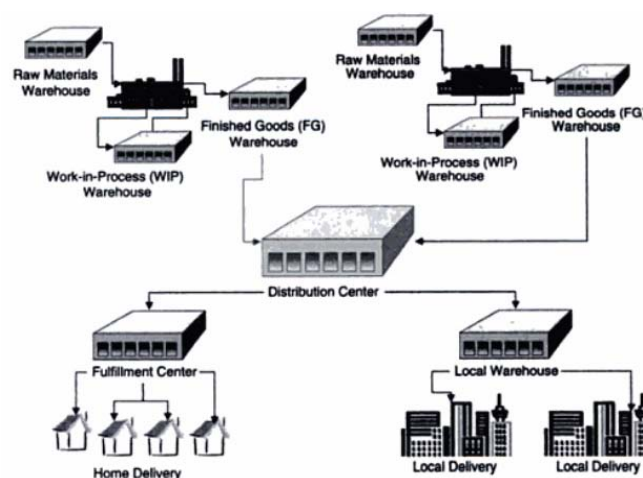


Figure 4.2 Roles of Warehouses in a Supply Chain (Frazelle, 2002)

Warehousing also plays an important role from the supply chain perspective. Despite all of the integration initiatives, supply chains will never be so well coordinated that warehousing can be completely eliminated. Frazelle (2002) states that warehouses are important for a supply chain because they provide storage for raw materials, components, work-in-process, and finished goods; operate as distribution and order fulfillment centers; and perform localized and value added warehousing. Figure 4.2 illustrates warehouses performing these functions in a logistics network.

4.4.3 TODAY'S WAREHOUSE REQUIREMENTS

Traditional warehousing continuously is declining since the last decade of the 20th century with the introduction of Just in Time (JIT) techniques, which are specially designed to enhance the return on investment (ROI) of a business by mitigating in-process inventory. Recent developments in marketing field have led to the development of warehouse designing style, where the same warehouse is used for warehousing and also as a retail store. These types of warehouses are equipped with tall heavy-duty industrial racks, with the items, which are ready for sale, are placed in the bottom parts of the racks and the palletized and wrapped inventory items being usually placed in the top parts.

Today's warehouse requirements are:

- Execute more, smaller transaction
- Handle and store more items
- Provide more product and service customization
- Offer more value-added services
- Process more return
- Receive and ship more international orders

At the same time, warehouses today have

- Less time to process an order
- Less margin for error
- Less young, skilled, English-speaking personnel
- Less WMS capability (Tompkins, Smith, 1998).

4.4.4 ROLE OF WAREHOUSE IN SUPPLY CHAIN

Since inventory holding and the customer serving are key warehouse functions which implies warehouse has an important role to play in supply chain. Some of the important roles of warehouse are to make or break bulk.

Consolidation centres, cross docking centres, transshipment, product fulfilment centres, returned goods depots, some other roles like customer support, installation and repair services. The roles mentioned here are associated with some concepts like agility, production postponements and time compression which are recognized as increasing trends in warehousing. Thus inventory has important role on warehouse in modern supply chains. (Baker, 2007)

4.4.5 PROBLEM AREAS IN WAREHOUSING

Warehouse management was considered to be very simple to handle in earlier days when everything was performed manually. The biggest problems then were the bar codes and space utilization in the warehouse. There has been drastic change in today's Internet world, after the outbreak of this internet technology everything was looking even simpler than the earlier days with more efficiency and consumption of less time and gaining a competitive advantage with potential economical savings. The evolving technology changed the warehousing methods a lot with logistics being carried out a quicker pace and with very little scope for error. Although there are many technologies evolving everyday, many problems are also arising making Warehousing more complex. This in turn is affecting the whole supply chain management. (Hompel, Ten., Michael., Schmidt, Thorsten., 2007)

The following are some of the problems being faced by today's warehouses:

- i) Automate all the mechanized or manual operations
- ii) Satisfy the requirements of the customer without much customization
- iii) Integration of the warehouse data with supply chain applications
- iv) Compatible to the cost- effective global supply chain

4.5 WAREHOUSE RESOURCES

Typical issues involved in designing and performing warehouse processes include allocating resources in terms of costs and capacity. When looking at the value of a product or service, the goal is to have the value of the end-product exceed the cost of producing it. Identifying

the value added activities inside the warehousing process is an essential but demanding task. Basically, the value assessment is made by examining each activity within the process and defining its criticality to operations. The cost of the product or service includes all resources used to produce it (e.g. raw materials, labor, storage space, transportation, equipment). According to a classification by Rouwenhorst et al. (2000), it is possible to identify the following list of distinguishable warehouse resources:

- Storage units – Used for the storage of products e.g. pallets, trays, boxes
- Storage systems – May range from simple shelves up to automated cranes and conveyors
- Pick equipment – Used for the retrieval of items from the storage system e.g. standard forklifts, reach trucks, pallet trucks
- Auxiliaries – Equipment, such as barcode scanners, that support warehouse activities
- Computer systems – Enable computer control of processes
- Material handling equipment – Equipment for preparing retrieved items e.g. sorter systems, palletizers, truck loaders
- Personnel – Human resources that operate and control all of the prescribed resources

Warehouse resources normally represent a sizeable capital investment. Approximately 50 percent of the costs in a typical warehouse are labor-related while facilities, machinery and storage equipment represent smaller portions of the investment (Aminoff et al., 2002). Reducing the amount of labor or pursuing higher labor productivity can be seen as a means to lowering warehouse-operating costs. This is typically done by investing in expensive warehouse technologies. However, to obtain an acceptable rate of return on equipment investments, they must be selected and used properly.

4.6 WAREHOUSING FUNCTIONS

The basic function of a warehouse is to receive customer orders, store or keep goods, retrieve required items, and finally prepare and ship those items. There are many ways to organize these operations but the overall process in most warehouses shares the following common phases. Therefore, the main functions of warehouse include movement, storage and information transfer.

As identified by Tompkins et al (1984) traditionally the basic warehousing functions include: receiving, identification and sorting, dispatching to storage, placing in storage, storage, retrieval from storage, order accumulation, packing, shipping, record keeping, etc.

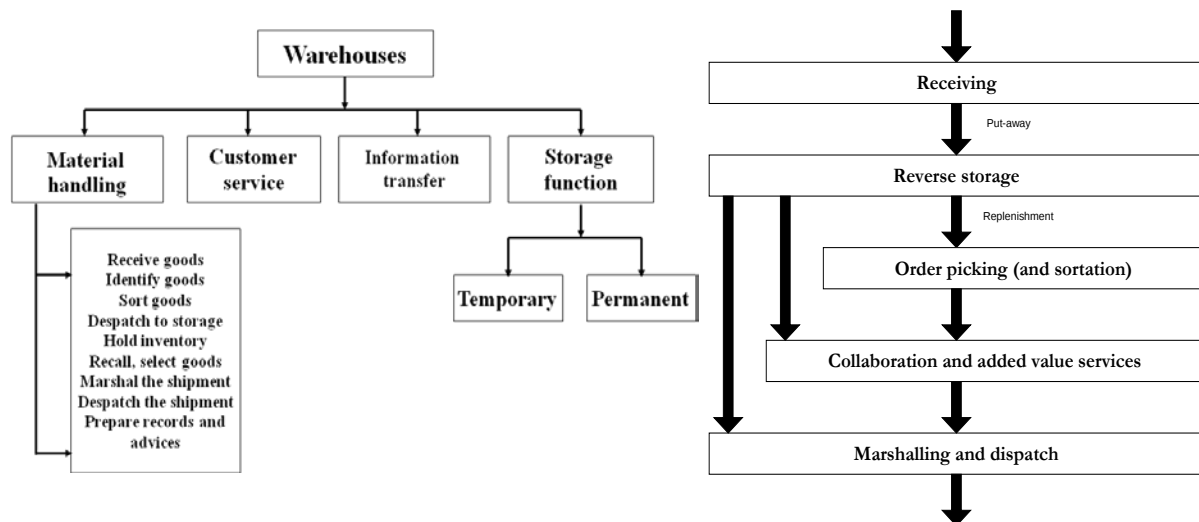


Figure 4.3 Typical Warehouse Functions and Material Flows (Alan et al, 2010)

Receiving: Receiving is the process of unloading, checking quality and quantity, and disassembling or repacking items for storage. It is the setup operation for all other warehousing activities. It allows the warehouse to schedule receipt and unloading within the warehouse. Product will be inspected and any noted exceptions, such as damage, incorrect counts, wrong description, and so on.

Receiving the merchandise properly is the key to warehouse operations, because it will create problems in put away, storage, picking and shipping, if the damaged or inaccurate deliveries are allowed into the warehouse then the same has to be shipped. Few world-class receiving practices are: direct shipping, cross-docking, receiving scheduling, pre-receiving, receipt preparation, etc.

Put-away: The put-away operation physically moves the items from receiving location to the storage area of the warehouse, which is also known as the reverse of order picking. The term putaway defines the appropriate location for items and transferring them to the specified storage location to wait for demand. When product is put-away, the storage location should also be scanned to record where the product has been placed. This information will subsequently be used to construct efficient pick-lists to guide the order-pickers in retrieving

the product for customers. Most of the principles which enhance or streamline the picking process work well for putaway.

Order-picking: The process of retrieving items from their storage locations and transporting them either to a sorting process or straight to the shipping area. This process requires warehouse personnel to select the items ordered by the customer or manufacturing operation in the storage area. The order information is given to the warehouse personnel on a pick slip or in case of an automated warehouse, the information is given to the computer. The personnel or automated process will locate the materials – handling system would run the picking process, when the order arrives at the shipping preparation area, the items would be placed in an exterior (shipping) package or on pallet. Then, a shipping label indicating the ship-to person/firm and address is attached to the package. Finally, the complete customer order is staged for loading into transport vehicle.

Shipping: The final movement process occurs at the shipping operation. Shipping process involves inspecting, packing, palletizing and loading items into a carrier for further delivery. Product is likely to be staged if it must be loaded in reverse order of delivery or if shipping long distances. When one must work due to the staged freight it must be double handled. The trailer is likely to be scanned to register its departure from the warehouse.

Out of these activities, receiving and putaway belong to the inbound logistics process, which means that they are concerned with the flow of materials coming into the warehouse. Order picking and shipping, on the other hand, belong to outbound logistics and are concerned with moving materials out of the warehouse.

4.7 THE ORDER FULFILLMENT PROCESS

The order fulfillment process involves generating, filling, delivering, and servicing customer orders. A large part of these activities are considered responsibility of the logistics and warehousing function. At the operational level, the order fulfillment process focuses on physical transactions, while on the strategic level the focus is usually on making critical improvements to the processes that influences financial performance of the firm, its customer, and its suppliers (Croxtton, 2003). The order fulfillment process is complex because it is composed of several activities executed by different functional entities. The order fulfillment strategy has strong implications on how firms customize their products and deal with product variety. Industrial service orders typically have quite variable demand patterns, which makes planning and forecasting difficult (Johansson & Olhager, 2004). In

times of high demand, capacity utilization will increase which leads to higher work-in-process and longer queuing. This will result in variable lead times, with potential implications on delivery reliability and service levels to the customers.

Physical handling of customer orders is a key element in the order fulfillment process. Order processing is the term generally used to describe the process or the work flow associated with the picking, packing and delivery of the packed items to a shipping carrier. The specific process and operational procedures are determined by many factors. Because each warehouse typically has its own unique requirements and priorities, a common notion has been that there is no single process that universally provides an optimized solution. Instead, the specific process flow of a warehouse is determined by factors such as the nature of the products and the number of differing items requested in each order.

4.8 TYPES OF WAREHOUSES

Stores facilities can be broadly broken in to two categories; stores buildings and stockyards. There are different kinds of warehouses and the classification of warehouses can be made from the following viewpoints:

- On the basis of structure
- On the basis of ownership
- On the basis of service rendered

Below we discuss various types of warehouses:

Raw material and component warehouses: It hold raw materials and always in a position to induct raw materials onto a manufacturing or assembly process.

Work-in-process warehouses: This warehouses hold partially completed products and assemblies at various points along production line or an assembly line.

Finished goods warehouses: It holds inventory usually to balance the variation between production schedules and demand. Normally these warehouses are situated near manufacturing plant, and it is characterized by the flow of full pallets in and full pallets out, assuming the product size and volume authorizes pallet-sized loads.

Distribution warehouse and distribution centers: Distribution warehouses accumulate products from various manufacturing points for combined shipment to the common customer. Normally, the warehouses are located central to either the production locations or

the customer base. Product movement represented by full pallets or cases in and full case or broken case quantities out.

Fulfillment warehouses and fulfillment centers: It receives, pick, and ship small orders for individual consumers.

Local Warehouses: These warehouses mainly for the purpose of responding to the customer demand. Frequently, single items are picked, and the same item is shipped to the customer every day.

Value-added service warehouses: Key product customization activities takes place like packaging, labeling, marking, pricing, and returns processing.

There is also one more classification of warehouses according to which geographical area they cater to:

- Centralized warehouse
- De-centralized warehouse

Centralized warehouse: Centralization generally refers to the allocation of the warehousing services to one particular business unit which provides services to the whole firm. The decisions are made at the central location for the entire network. The main characteristics of a centralized approach are control, efficiency and good economy.

Benefits:

- Improvement in productivity through balancing
- Increase in available knowledge
- Bundling of product flows
- Combined use of production flows
- Control on the system
- Uniformity in the processes
- Improved efficiency

Limitations:

- Customer desire of self pickup cannot be provided
- Problem of concentration of customers in only certain markets and inhomogeneous customer structure
- Long internal transport paths in large central warehouses and higher costs for the infrastructure

- Slow process of decision making, less flexibility
- High initial costs
- Bureaucracy in the system
- Inflexibility
- Dependent systems

De-centralized warehouse: Decentralization approach gives the individual business units autonomy and independency over their own resources without any major considerations over the remaining units unless there is a necessity for the overall organization policy. In this approach each facility identifies its most effective strategy without considering the impact on the remaining facilities in the network and this leads to the local optimization. The main characteristics of the decentralized approach are empowerment of individual business units, flexibility, and service orientation. They provide as good service as the centralized warehouses in terms of customer service level.

Benefits:

- Rapid adjustment to the changes
- Flexibility
- Quality
- Innovation
- Low startup costs
- Customization and catering to individual needs is possible
- Increase in responsiveness
- Improvement in reliability

Limitations:

- Lack of centralized control
- Duplication of resources
- Extensive use of effort and expertise
- Increase in costs

4.9 WAREHOUSE DESIGN AND LAYOUT

Designing warehouses is challenging because it involves so many trade-off decisions. Each warehousing function needs to be carefully implemented in order to achieve operational

targets. These targets are often expressed in terms of capacity, throughput, and customer service levels.

A typical structured approach of warehouse designing could be as follows:

- i) Determining the overall space requirements for all warehouse processes
- ii) Specify a U-shape, straight-thru, or modular overall flow design
- iii) Locate functions with high adjacency requirements close to one another
- iv) Assign processes with high storage requirements to high-bay space and labor intensive processes in low-bay space
- v) Document expansion and contraction strategies for each warehouse process

Design and layout principles for warehouses

- Use a one-storey building wherever possible.
- Use straight-line or direct flow of goods in and out of the warehouse with goods being delivered at one end, held, and ranked according to ABC analysis.
- Utilize an effective storage plan to maximize warehouse operations and to avoid inefficiencies.
- Use efficient materials handling equipment.
- Minimize aisle space within the constraints of the size, type and turning circle of materials handling equipment.
- Maximize use of the building's height to use the cubic capacity fully.
- Use an efficient system of product identification.
- Plan for growth.
- Ensure full attention is given to health and safety issues.

The way, in which various warehousing functions are arranged, depends on many issues. Firstly, the physical quality of the warehouse facility may set certain restrictions. For example, receiving and shipping functions should normally be located near the facility input and output points. On the other hand the facility may have some fixed obstacles that hinder entering and performing work tasks in certain areas. Second, management typically wants to balance the flow patterns between various activities and minimize the travel distances for stock movement. This can be achieved through systematic identification of stock locations and adjacency requirements between different warehouse activities. Finally, product

attributes may require certain kind of handling procedures. Some items, for example, may be temperature sensitive which requires processing them in a climate controlled location.

Baker & Canessa (2009) in their article “Warehouse design: A structured approach” has acknowledges that the warehouse design process is highly complex. The authors often seem to tackle this complexity by describing sequenced procedures for creating an appropriate warehousing solution. However, because there are a high number of decision variables, it may not be possible to identify an “optimal” solution. As a result, steps in the design process are typically interrelated and reiterative decision-making methods are needed during the process.

In designing warehousing systems it is desirable to maximize (Tompkins et al. 1996):

- space utilization;
- equipment utilization;
- labor utilization;
- accessibility of all materials;
- protection of all materials.

Storing goods in adequate space with the proper equipment by well trained personnel in a properly planned layout results in maximum protection of items.

Types of Warehouse Layout are:

- The through flow system
- Inverted “T” flow
- Cross flow system
- Corner flow system

4.10 WAREHOUSING COSTS

Warehousing activities incurs cost. Figure 4.5 represents the typical distribution of costs between various warehousing activities as a percentage of total warehousing costs.

Warehousing costs are generally classified as follows:

General overhead cost: This cost involves the cost of the space available per cubic square foot and infrastructure. This also includes the cost for various security devices such as security alarms, auto IDs.

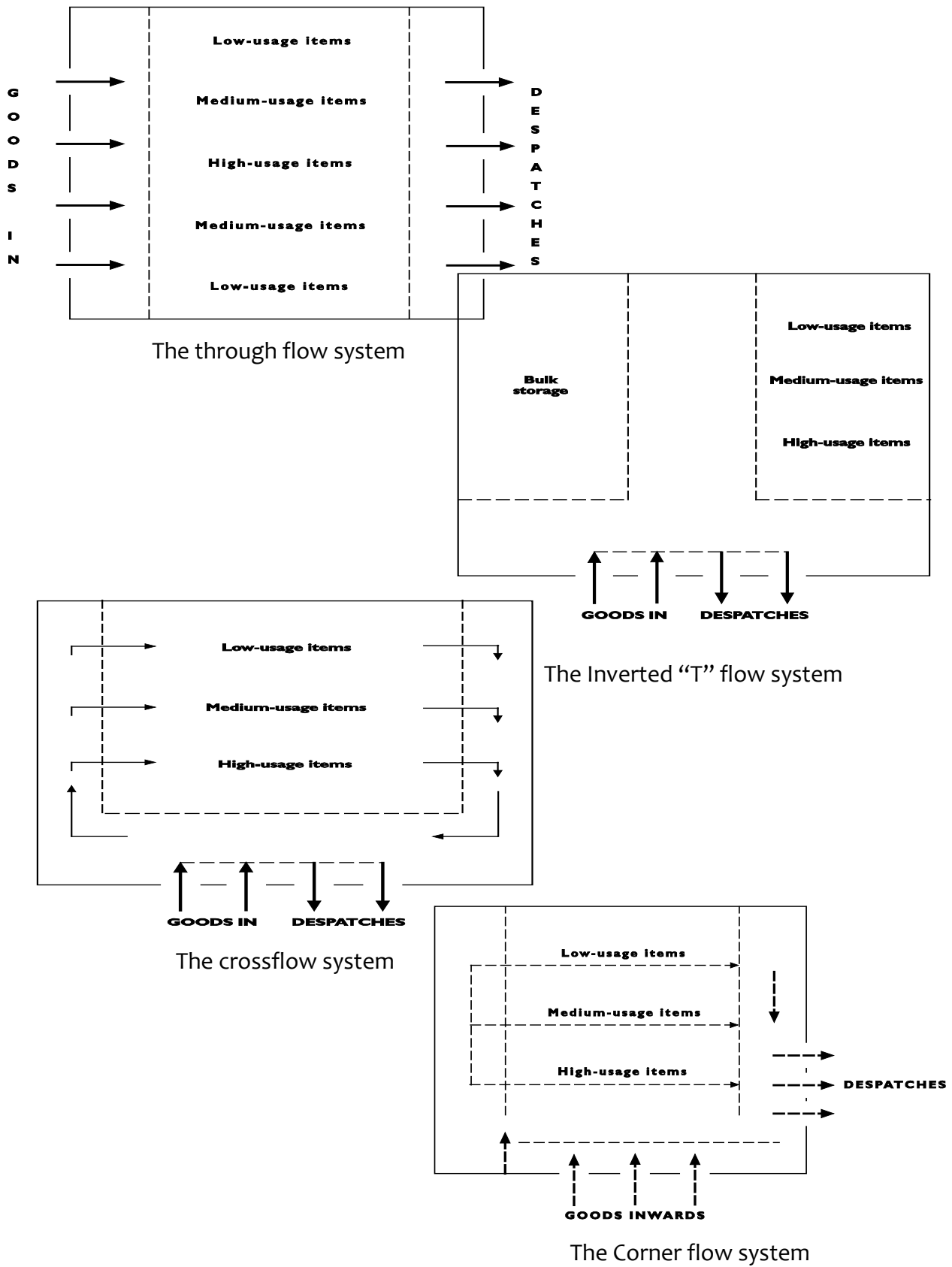


Figure 4.4 Different types of warehouse layouts (Storage and Distribution, 2010)

Delivery cost: This cost includes the cost incurred in the distribution of the freight by an outside vendor. This cost includes the cost of fuel, insurance and the cost of the delivery trucks.

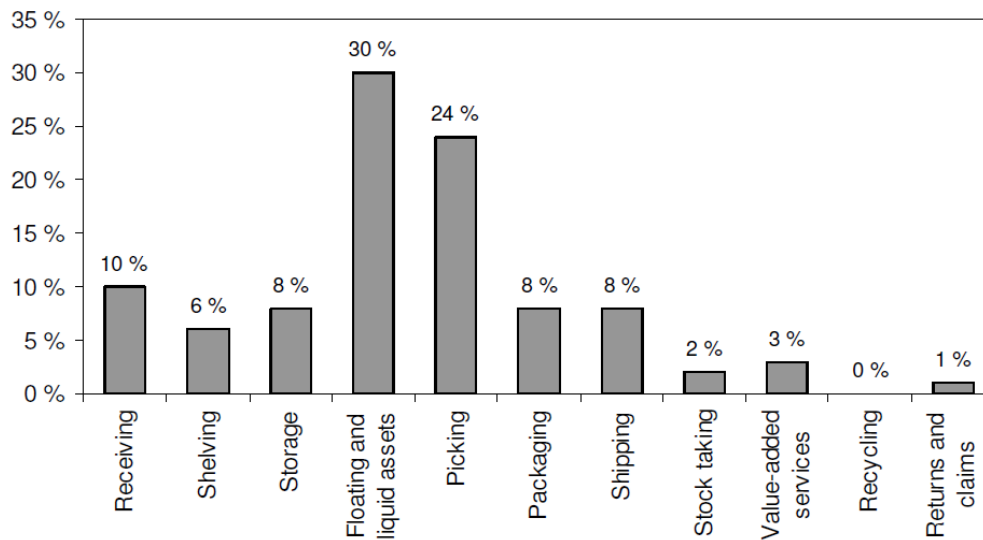


Figure 4.5 Average Costs of Warehousing Operations (Aminoff et al., 2002)

Labour cost: This is the cost, which involves the cost of the labour that perform various operations in the warehouse including the operations such as receiving the incoming goods, entering the relevant data into the computer systems and some of the administrative duties such as assigning warehouse positions and job works on a daily basis.

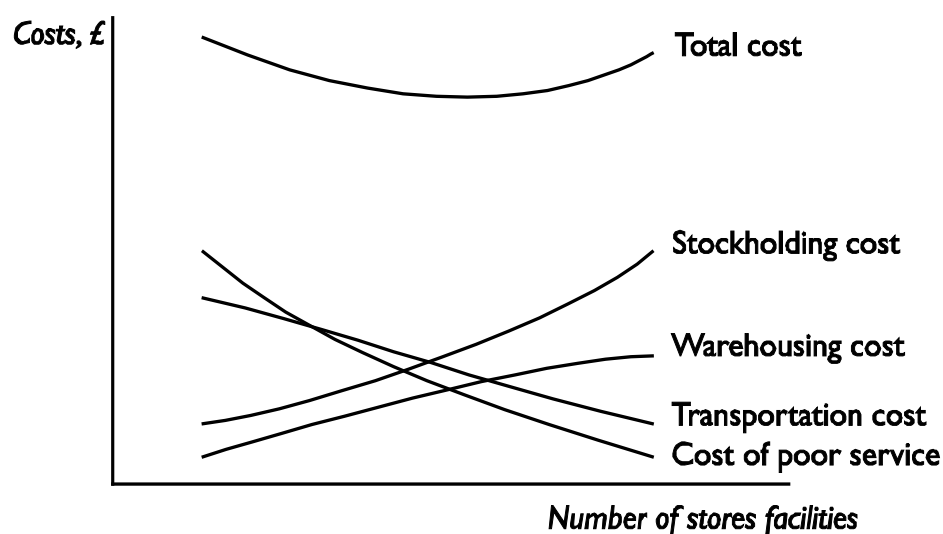


Figure 4.6 Cost of Store Facilities

The warehouse costs can also be classified as:

Processing costs: These are the costs incurred by various operations and processes carried out in the warehouse such as receiving, storing, picking, packaging and shipping. If any other costs are involved in assembly are included in the processing cost.

Storage costs or Handling costs: These are the costs incurred to store and handle the products and are also known as inventory holding costs.

4.11 WAREHOUSE TECHNOLOGIES

Advances in warehouse technologies have made many developments in the warehouse efficiency possible. It is useful to think of warehouse technologies consisting of two elements. The first element involves the use of computers for planning and directing activities. The second is the degree of mechanization or automation. Naturally, the goal of automating warehousing operations is to enhance efficiency of material handling through reduction of labor costs and increased throughput. The evolution of systems created for warehousing is not very different from many other technology solutions in the sense that most of them are based on few core functionalities on top of which developers have started to add small features that they have seen as valuable for accomplishing specific tasks.

4.11.1 AUTOMATING AND MECHANIZING PROCESSES

A warehousing system refers to the combination of equipment and operating policies that are used in a storage/retrieval environment. The simplest storage method is block stacking which is a typical method for stocking bulk items. Although block stacking is very cheap it results in low accessibility to items due to the honey combing effect. To enhance accessibility, most warehouses consist of parallel aisles with products stored along sides. Small items can usually be placed in bin shelves or modular storage drawers fairly efficiently while larger items are typically placed on pallet racks.

Warehouse technologies are used for three main reasons: save storage space, improve productivity, and reduce errors (Aminoff et al., 2002). Selecting the appropriate level of warehouse automation is a difficult task. Capital investments can be considerable but the rewards often include significant savings in terms of labor costs and productivity, inventory accuracy, or order processing times. With respect to the level of automation it is possible to distinguish three types of warehousing systems (van den Berg & Zijm, 1999):

- Manual warehousing systems (picker-to-product) – The order picker collects the product in the warehouse by travelling to the storage location.
- Automated warehousing systems (product-to-picker) – The picking operation is performed by an automated device, delivering items to a stationary order picker.
- Automatic warehousing systems – This system is similar to the automated warehousing system except that the picker is replaced by a robot.

One key to effective design of warehouse processes is the relative dominance between picking and storage activities because these two warehousing functions typically have opposing requirements. Techniques that maximize space utilization tend to complicate picking and render it inefficient while large storage areas increase travel distances, which reduces picking efficiency. Ideal picking requires small stocks in dedicated, close locations.

Automation of picking, storage, handling and information can compensate for these opposing requirements to a degree. However, automation is expensive to install and operate. Table 2-2 shows how different transaction volumes, storage requirements and technologies lead to different warehousing concepts are shown in Figure 4.7.

High picking and storage requirements indicate a large and active warehouse. In these situations mechanized handling of orders and high density of storage often justifies itself. On the contrary, a simple small warehouse seldom needs such sophisticated systems and can be operated completely manually. A picking dominated warehouse should be compact and dense with simple storage. While on the other hand, a storage dominated warehouse should enable high density multi-level storage with simple manual picking operations.

		Storage requirements	
		High	Low
Picking activity requirements	High	▪ High density storage ▪ Automated handling	▪ Dedicated locations ▪ Low density storage ▪ Automated handling
	Low	▪ Random location ▪ Dense storage ▪ Manual handling	▪ Dedicated pick locations ▪ Dual storage ▪ Low density storage ▪ Manual handling

Figure 4.7 Different Warehouse Concepts (Phillips, 2010)

4.11.2 THE ROLE OF INFORMATION SYSTEMS

Warehouse execution systems can be classified into two categories - the warehouse management systems (WMS) and warehouse control systems (WCS). The primary purpose of a warehouse management system is to control the movement and storage of materials within a warehouse and process the associated transactions. Typical roles of a warehouse management system include directing and sharing transaction data for the picking, replenishment, and putaway operations. The system may be standalone applications although most modern Enterprise Resource Planning (ERP) systems have modules with corresponding functionalities.

The primary function of a warehouse control system is to receive information from the upper level host system, most often being the warehouse management system, and translate it for the daily operations. A common goal is to ensure a situation where warehouse employees never have to retype information because it already lies in one system or is collected automatically (Yao & Carlson, 1999). Warehouse control system is usually the interface that is used to manage processes, people and equipment on the operational level. The roles of warehouse control systems commonly include:

- Transmit information and manage automated equipment
- Direct and schedule work processes (e.g. job sequencing, job verification)
- Monitor and report performance (e.g. picking rates, error rates)
- Simplify or provide a graphical user interface
- Interface with other management information systems

4.12 TOTAL QUALITY MANAGEMENT IN WAREHOUSING OPERATIONS

TQM is a management approach to the organizations which pay more emphasis on quality of the warehouse and the warehousing operations and it aims at long term success through customer satisfaction and some other benefits to the members of the organization and also to the society and the environment. TQM had a remarkable impact in the manufacturing industry as well as the logistics industry ever since it has been adopted by the businesses. The quality and the marvellous performance of a company mainly depends on four factors, those are: (Gunasekaran, Marri, Menci, 1999).

4.12.1 LEAN WAREHOUSING

The generation of waste in the warehouses creates two problems:

- The value which is added is lost due to the wastes generated in the warehouse.
- The waste generates the cost of disposals which is always increasing in nature.

A strict inspection in the supply chain would prevent the wastes generated by transportation. In the manufacturing process if a defective item is produced, it merely ends up as a waste and thrown into the scrap which is disposed afterwards. To generate scrap as good as ordering things which will remain in the warehouse until they are disposed off. These also occupy lot of space in the warehouse which cannot be utilized for some other operations.

4.12.2 TOTAL QUALITY MANAGEMENT

TQM's main concept is to eliminate the waste and reduce the production of defective items during the manufacturing. The relationship between suppliers and buyers which ultimately leads to the final customer must be integrated to prevent poor quality.

Total quality control is the process of setting a standard of acceptability for the goods purchased in the warehousing operations. All the items need to comply with the specifications of the process or a product. If any item does not comply with the specification, it must immediately be rejected.

4.12.3 CONTINUOUS TRAINING PERIOD

Teamwork is always a great tool for the growth of any organization. Teamwork allows the sharing of skills and knowledge and helps to brainstorm new ideas among the departments and teams in a warehouse. Proper training is a good means to improve the skills and know how of warehouse personnel which in turn improves the overall standards of the warehouse. (Gunasekaran ,Marri, Menci, 1999)

4.12.4 ISO CERTIFICATION FOR A WAREHOUSE

The quality certification for a warehouse offers a proof of commitment to quality for a company which is certified with ISO certification. The certification also acts as a benchmark allowing the businesses to measure the progress towards the direction of continual improvement of the warehousing operations. If a company goes ahead for the certification, all the personnel should be aware of it and everybody should contribute for the achievement of the certification. The certification helps in growth of confidence within the company as well as the confidence of the client towards the supplier as a result of improved relations which become more visible and direct. There can also be accumulation of knowledge due to

the quality standards followed in the company which helps the personnel to use that respective knowledge in the future. The efficiency as well as the control over the operations will also increase due to the growth of knowledge and confidence in an organization which is a direct impact of the certification. (Gunasekaran ,Marri, Menci, 1999).

4.13 LABOUR MANAGEMENT IN WAREHOUSING

An Ideal labour management measures the individual performances against standard times applied with the help of a labour management system that forms an interface between the labour management system and the time and attendance systems. The outcome results commonly in time, used by the warehouses to improve productivity. An effective labour management should support workload planning, process improvement, and in some cases, incentive schemes.

A basic challenge for all warehouse managers is allocating right number of people in the right place and at the right time to produce quality work. Warehouses with more number of employees result in high labour cost, low productivity and less profits. Alternatively with less staff there is a problem of employee burnout, quality problems and higher costs. It is a proven fact that labor management could cut down the costs to a considerable level arising due to labor, warehouses with a labor management can save more on increasing resources.

The growing demand for value-added services, labeling and promotional display, packaging, reverse logistics, recycled packaging and product for rework and customer returns, had a direct impact on the warehouse costs, and thereby increasing the cost per employee. Few case studies suggest an increase in productivity with labor management. Most of the warehouses have experienced a significant performance improvement, and also stated that performance would fall back considerable without a labor management application (Dymond, 2007).

4.14 INVENTORY CONTROL

Many concepts about control and management of inventory has been written but very little has been written about how inventory can be measured and monitored in a best way in the warehouse, even though the stock is measured and monitored every day by thousands of organizations. Inventory control has been represented as the function of management – forecasting, exploring requirements, setting up targets and issuing instructions. The monitoring of stocks in the warehouse is considered to be supervisory function, which

requires less skill and experience. Overlooking of, monitoring and measurement process results in unreliable and low quality inventory management.

The main purpose of inventory management is to provide the appropriate information to improve operations and reduce errors, but very often it is confined to stock valuation process rather than contributing to effective logistics.

Inventory in the warehouse can be categorised as follows:

- Raw materials and components: Goods purchased by the organization
- Work in progress: partly manufactured items and have had value added
- Finished goods: goods ready for shipment to customers

The quantity of goods held and their management will differ largely from one organization to another. It is very important that the inventory has to be monitored where ever it is held (Ballard, 1996).

4.15 VALUE ADDING ACTIVITIES IN A WAREHOUSE

In economics, the difference between the sales price of a product and the cost of resources used to produce it is called the value added. The effort to gain additional value is typically a customer-driven process aimed at retaining a higher monetary value for each unit being sold. This can be achieved by enhancing the product and its associated service offering.

Although the role of warehouses has changed tremendously over time, it has traditionally been an essential part of industrial distributors' operations. Industrial companies rely heavily on raw materials, work-in-process, and finished goods inventories which are almost unexceptionally placed in warehouses or production facilities with departments that resemble warehouses. The simplistic approach to warehousing assumes that it is only concerned with the storage, repacking, and shipment of products. However, the modern competitive environment has shown that redesigning the functionality of a warehouse can play a significant role in the value offerings a firm is capable of delivering. Most of the customer specific service offerings are physically performed in the warehousing environment. Therefore, paying attention to the customer needs should be an essential part of the warehouse planning and order fulfillment strategy.

Value adding activities in a warehouse include:

Consolidation: Warehouse unites these single items into a bulk order according to the manufacturers or plant requirements and then ships the unified product.

Product mixing: Normally a warehouse receives different kind of finished products from different plants, and one customer needs different mix of products which is effectively performed by warehouse.

Service: The service performed by the warehouse can be of different types starting from receiving until shipping of goods. For example some warehouse performs extra decorative things to the products before the final shipping to the customers.

Contingency protection: It is very important for the warehouses to maintain a back up data and other essential records in order to cope with any kind o situations. Normally, warehouse plans in advance for any future requirements such as inventory maintenance or storing of products or security of goods etc, thus always equipped with contingency protection.

Smooth operation: Warehouse between manufacturer and customer makes the operations very effective since different value adding activities are being performed at the warehouse. Consolidation and product mix are the two important activities which improve the customer satisfaction level and enable a smooth operation. Warehouse in position helps in shipping the right kind of goods to the right place at the right time.

4.16 THE IDEAL WAREHOUSE

In the present business world, all the warehouses are striving to attain an ideal warehouse in which every equipment is automated and integrated with the computer systems which minimize the effort put on to perform the operation and cuts down the cost for the operation. This will at the same time reduce the man power required to perform various operations in a warehouse.

4.16.1 CHARACTERISTIC OF AN IDEAL WAREHOUSE

Any warehouse is said to be an ideal warehouse if it possesses the below mentioned characteristics:

- Warehouse should be located at a convenient place near highways, railway stations, airports and seaports where goods can be loaded and unloaded easily.

- Mechanical appliances should be there to loading and unloading the goods. This reduces the wastages in handling and also minimizes handling costs.
- Adequate space should be available inside the building to keep the goods in proper order.
- Ware houses meant for preservation of perishable items like fruits, vegetables, eggs and butter etc. should have cold storage facilities.
- Proper arrangement should be there to protect the goods from sunlight, rain, wind, dust, moisture and pests.
- Sufficient parking space should be there inside the premises to facilitate easy and quick loading and unloading of goods.
- Round the clock security arrangement should be there to avoid theft of goods.
- The building should be fitted with latest fire-fighting equipments to avoid loss of goods due to fire.

In a highly automated warehouse, material is received in unit loads or in cases on a case conveyor or a pallet, then these are made into unit loads and sent to automated storage and retrieval system. The unit loads can be picked easily from the automated storage and retrieval systems to fill the customer orders. They can also replenish case, inner packs etc. Then the material is picked and transferred through a conveyor to fulfil the customer order. The major problems in this kind of warehouse are that there is non-standardization for the pallet size, case, and the inner pack and not all goods have the same shape and size even among the same company products. This ideal warehouse system can be useful only when there is standardization of the pallets or the inner packs for the materials. (Raymond A. Nelson, 1985)

CHAPTER 5

LITERATURE REVIEW: WAREHOUSE MANAGEMENT

5.1 INTRODUCTION

Warehouse management is concerned with ensuring that all the activities involved in warehousing are carried out efficiently and effectively by those employed in the warehouse. Online Encyclopedia of Business has defined warehouse management as “the process of coordinating the incoming goods, the subsequent storage and tracking of the goods, and finally, the distribution of the goods to their proper destinations”. Every organization, regardless of size, has developed and implemented its own management concepts in order for it to run smoothly and accomplish the vision, goals and objectives it has set forth.

Management is ‘the process through which efforts of members of the organization are co-ordinate, directed and guided towards the achievement of organizational goals: the clarification of objectives, planning, organizing, directing and controlling other people’s work’. Mary Parker Follett was the first to define management as the art of getting things done through people. In common understanding, management is also referred to the body or group of persons who perform the various functions of management.

The overall purpose of management is to ensure that the organization is able to achieve success through people. Management aims to increase organizational effectiveness and capability – the capacity of an organization to achieve its goals by making the best use of the resources available to it. Therefore, management can be defined as the process of achieving results by making the best use of available human, financial and material resources. Management has the following 3 characteristics (Management Innovations, 2008):

- It is a process or series of continuing and related activities.
- It involves and concentrates on reaching organizational goals.
- It reaches these goals by working with and through people and other organizational resources.

According to Armstrong and Michael the fundamentals of management is deciding what need to be done and getting it done through people in organization (Study Mode, 2011). They highlighted that people of an organization is the main resource among all other resources that is needed by a manager to manage, which indicates that a large proportion of management work is done through people of an organization. Therefore, in any management process managers plays a vital role in operating an organization.

Steven P. Robbins and Mary Coulter (2005) have defined 'Manager' as "someone who works with and through other people by coordinating, integrating and monitoring their work activities in order to accomplish organizational goals". Traditionally structured organizations managerial hierarchy is shaped like a pyramid as shown in Figure 5.1.



Figure 5.1 Managerial Levels
(Source: Steven P. Robbins and Mary Coulter, 2005)

Managers could be classified as:

First-line Managers also called supervisors are at the lowest level of management (i.e. supervisors, team leaders or, foreman etc.) and manage the work of non-managerial employees. They are involved mainly in short-term 'activities' planning – sometimes called 'operational planning' and responsible for 'transaction control' which includes the day to day running of departments or sections and individual assignments.

Middle Managers or the senior managers manage the work of first-line managers and responsible for operational management. They are involved in 'tactical planning' and decision making, that is, planning how the overall strategies are to be achieved; devising and operating short-term plans, for up to a year ahead.

Top-level management or the board of directors are involved mainly with strategic management and policy planning decisions, which are concerned primarily with deciding what the objectives of an enterprise, should be in two, four, five or even ten years ahead, and its future policies.

A manager wears many hats. Not only is a manager a team leader, but he or she is also a planner, organizer, cheerleader, coach, problem solver, and decision maker — all rolled into one. These roles fall into three categories (Steven P. Robbins and Mary Coulter, 2005):

- Interpersonal: This role involves human interaction.
- Informational: This role involves the sharing and analyzing of information.

- 0 Decisional: This role involves decision making.

5.2 THE FUNCTIONS OF WAREHOUSE MANAGEMENT

The functions of management uniquely describe managers' jobs. The most commonly cited functions of management which equally applies for warehouse management are planning, organizing, leading, and controlling, although many experts have identified additional functions of management. Henri Fayol was one of the first theorists to define functions of management in his 1916 book “Administration Industrielle et Generale”. Frenchman Henri Fayol identified 5 functions of management, which he labeled: planning, organizing, commanding, coordinating and controlling (Wikipedia).

George & Jerry identified four fundamental functions of management namely planning, organizing, actuating and controlling; but Luther Gullick has proposed eight functions represented by the keyword 'POSDCORB' where P stands for Planning, O for Organizing, S for Staffing, D for Directing, Co for Co-ordination, R for reporting & B for Budgeting; whereas KOONTZ and O'DONNEL has given five functions of management i.e. Planning, Organizing, Staffing, Directing and Controlling (Management Study Guide).

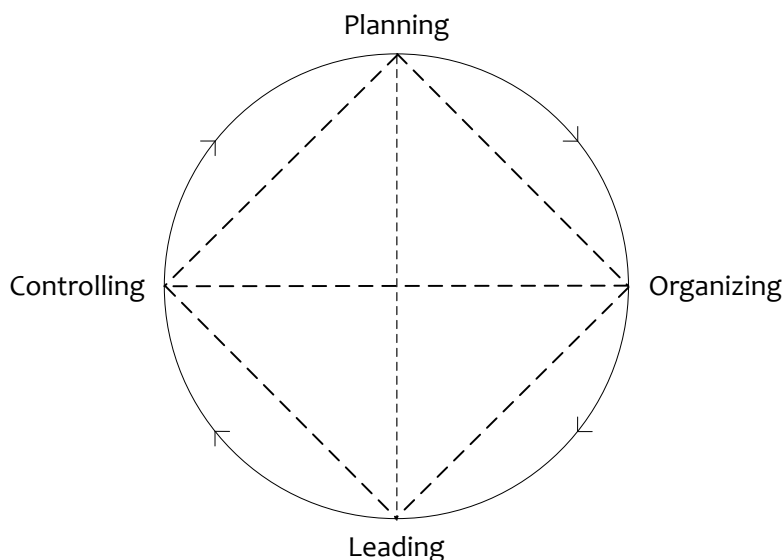


Figure 5.2 Management Function Cycle

For theoretical purposes, it may be convenient to separate the function of management but practically these functions are overlapping in nature i.e. they are highly inseparable (Figure 5.2). Each function blends into the other & each affects the performance of others. In the

context of warehousing, the basic functions of management could be broadly broken down into four major areas which allow for it to handle the strategic, tactical and operational decisions for the organization. The four functions or types of activities of warehouse management are:

- o Planning
- o Organizing
- o Leading
- o Controlling

Theorists like EFL Brech and Peter Drucker (Management in the Purchasing Function, 2010) also suggested that management involved certain basic functions designed to bring system, order, rationality and consistency to the organizational environment. Brech identified four main functions of management, which includes planning, control, co-ordination and motivation. Peter Drucker has also suggested five management functions: objective setting, organizing, motivating & communicating, measuring and developing people.

These functions are universal and all managers at all levels of every organization perform these functions in their daily work, but the amount of time a manager spends on each one depends on both the level of management and the specific organization. We will examine these functions in greater detail shortly, and show how they interrelate and what they entail in practice. However, as they are all concerned with achieving business objectives and policies, let us first discuss these terms a bit.

Objectives are the goals which an organization aims to achieve. Basically, objectives transform the Vision, Mission and Goals of an organization into targets or aims which it will pursue; in fact their attainment is the principal reason for the existence of that organization. In every organization, there is a hierarchy of objectives just as there is a hierarchy of managers. The general objectives at the top of the hierarchy are relevant to all aspects and members of the organization, at a general level; they cascade down to the more specific objectives of business units, groups and individuals (Strategic Supply Chain Management, 2010). Commonly the statement of objectives at each stage of this cascade can be termed as described in Figure 5.3.

Business policies are the guidelines developed by an organization to govern its actions. They define the limits within which decisions must be made. Management Study Guide defines “Business Policy” as the scope or spheres within which decisions can be taken by the

subordinates in an organization. It permits the lower level management to deal with the problems and issues without consulting top level management every time for decisions. Business policy also deals with acquisition of resources with which organizational goals can be achieved. It is the study of the roles and responsibilities of top level management, the significant issues affecting organizational success and the decisions affecting organization in long-run.



Figure 5.3 Hierarchy of Objectives
(Source: Strategic Supply Chain Management, 2010)

Together with the decision on the objectives of an enterprise is the necessity to decide in broad terms how and where the objectives are to be achieved, that is, to lay down the basic policies of the enterprise. If the objective of a particular enterprise is to sell, then it must be decided how sales will be made (for example, for cash and/or on credit) and where sales will be made; from shop(s) or by mail-order or through travelling or door-to-door salesmen, etc., and, of course, where the premises of the enterprise will be located.

Once the initial objectives and basic policies of an enterprise have been decided upon, the interpretation and implementation of the policies and the achievement of the objectives are the responsibilities of the management team. In other words, they have to set in motion the various activities which will actually gain those objectives IN PRACTICE. That involves two important considerations:-

- Firstly the policies must be interpreted. This means that the policies must be examined carefully, and “broken down” to see clearly what activities and tasks will be have to be undertaken.

- Secondly, once it is clearly understood what is to be involved, it can be decided what steps must be taken to implement the policies; that is, what actions are necessary to put them into practice.

Therefore, to simplify we can say that, the 'policies' have to be 'translated' into action.

Unless an enterprise is very small, in addition to there being objectives for the enterprise as a whole, there will also be departmental or section objectives set by the Board, with policies laid down for the attainment of them. It should be noted that unless each department, Stores included, attains its set objectives, the overall objectives of the enterprise as a whole might not be achieved. The interpretation of the policy for the Stores Department, and its implementation to achieve the department's objectives will be the responsibility of the Stores Manager. This brings us back to the four main functions of management, which we can now consider in greater detail in the context of Warehouse Management.

5.3 WAREHOUSE PLANNING

Planning is the activity concerned with making or formulating plans. It entails deciding how the predetermined objectives of the enterprise, or a department of it, should be achieved in the most efficient and economical way in accordance with policy. Plans can be looked upon as being routes to objectives. Once objectives have been set, planning is necessary to work out how to achieve those objectives within the framework of the policy formulated. In the warehousing process there are several planning issues from the initial stage of a warehouse to its day to day operations.

Planning should be undertaken according to a certain hierarchy that reflects different planning time horizons. These are generally classified as strategic, tactical and operational. They are represented in Figure 5.3. There is an overlap between the main planning stages, which emphasizes that there are many planning factors that can be covered by different stages in this planning hierarchy. The relative importance of these various aspects of warehousing may differ between one company and another.

The choice of warehouse location could, for example, be an initial strategic decision and also a subsequent tactical decision for the same company. It might be a strategic decision for a company that setting up anew but might be a tactical decision for another company that is expanding its business.

Figure 5.3 also indicate the interrelationship of planning and control within this hierarchy. Both of these different elements are essential to the running of an effective and efficient warehouse operation. One way to envisage the difference between these two concepts is as follows: planning is about ensuring that the operation is set up to run properly – it is ‘doing the right thing’ or preparing for and planning the operation ‘effectively’; control is about managing the operation in the right way – it is ‘doing the things right’ or making sure that the operation is being run ‘efficiently’. The detailed discussion on controlling is provided in section 5.6.

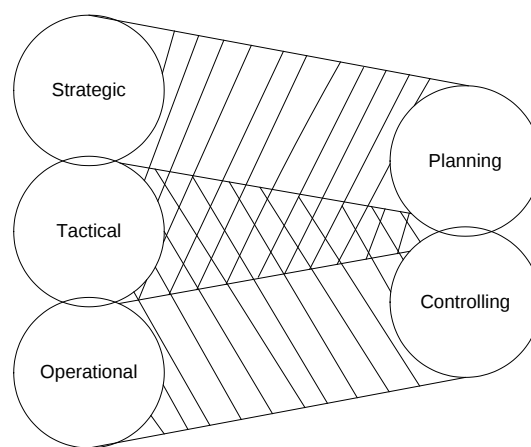


Figure 5.4 Warehouse Planning Hierarchy
(Source: Logistics & Distribution Management, 2011)

Once again it is not relevant to define exactly which strategic, tactical and operational decisions or tasks within a company should be classified as either planning or control. Most elements need to be planned correctly in the first place, and then subsequently they need to be monitored and controlled to ensure that the operation is running as well as it should be.

The major functions of the different planning time horizons are summarized in Figure 5.4. The importance and relevance of these different aspects will, of course, vary according to the type and scale of business, product, etc.

First-line Managers for example planning how to fill an order or how and where to store a consignment of newly delivered items, or deciding what each member of staff should be doing at any given time.

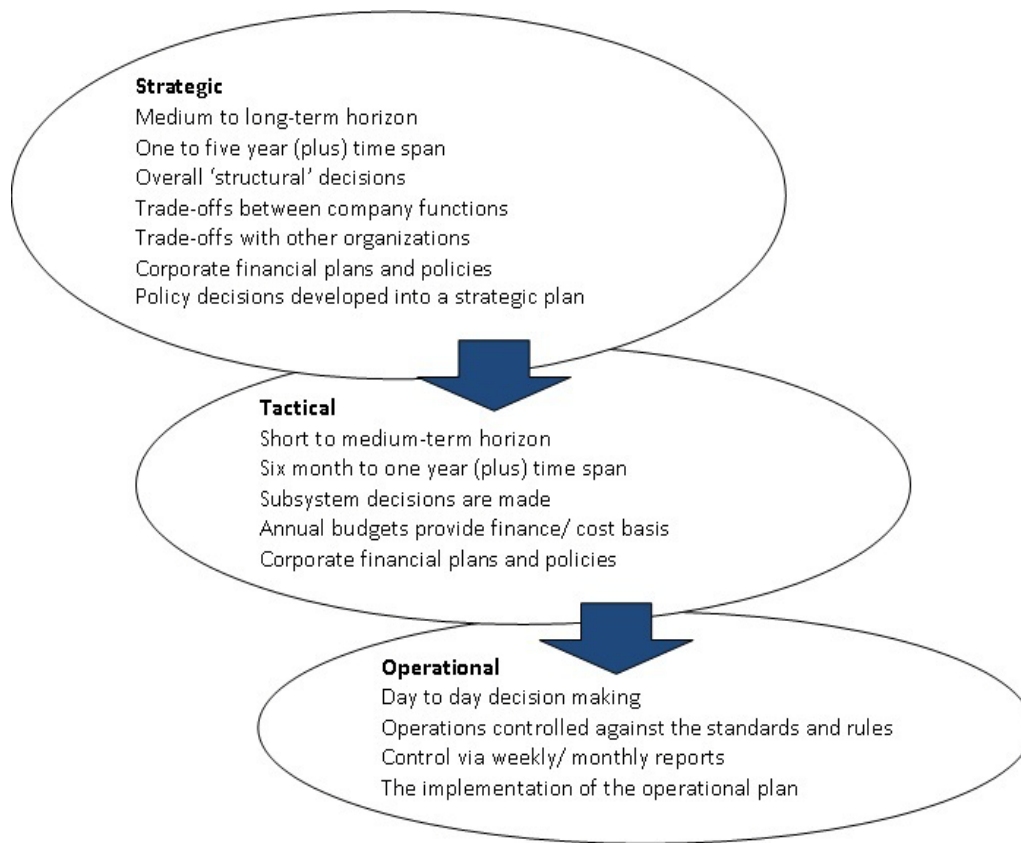


Figure 5.5 The Major Functions of Different Planning Time Horizon
 (Source: Logistics & Distribution Management, 2011)

It is possible to identify many different elements within warehousing that can be broadly categorized within this planning hierarchy. As already indicated, these may vary from one company to another and from one operation to another. Some of these – in no particular order – are as indicated in Figure 5.5.

5.3.1 FLEXIBILITY IN PLANNING

Everyone loves a plan that goes without any hitches. But the truth of the matter is that, plans are never perfect and in some way or another, plans get derailed and adjustments must be made. At any point things may not go as planned resulting in severe disruption to the achievements of business objectives or even the company could be ruined. But being flexible with options is important in order to achieve goals and is necessary for the existence of an organization.

Plans provide organizations with the backbone of how they want things to be accomplished. Flexibility on the other hand provides them the chance to modify it as it is needed. Organizations often take so much time to create the perfect plan but no matter how they try

to calculate everything that may come in their way, there are some things that they just can't quantify. At times they take so much time hatching up the best plan, trying to hone it over and over again that they lose their sight on the objective. General George S. Patton, a well respect officer of the US armed forces once said that "I would rather have a good plan today than a perfect plan two weeks from now."

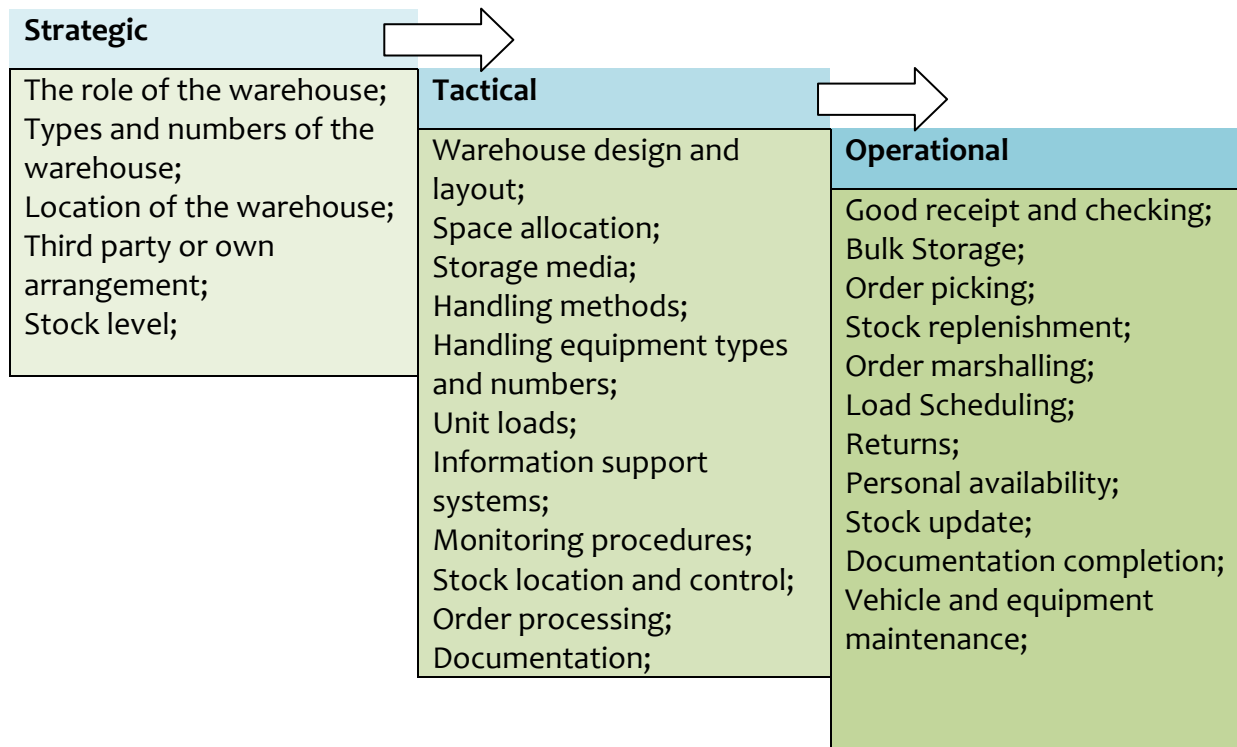


Figure 5.6 Different elements within warehousing

What is essential is organizations deep understanding of their goals. The wind may blow their boat in different ways but it is up to them to stir towards the right way no matter from where the wind blows. Knowing the objective and keeping their focus on it will help them maneuver around obstacles no matter how daunting it may be. The objective is always above the plan.

Flexibility in Planning will help organizations push forward closer to their goals if they truly commit their selves to achieving it and not simply plan for it. Action, as they say "speaks louder than voice". However, the right actions at the right time are the ones needed to get them closer and faster to their goals.

Therefore, plans must be flexible so that they can quickly and easily be modified in the light of events. For example, a Warehouse Manager might have decided how his office staff will cope whilst another member is on holiday, and has planned the rearrangement of the work.

But the day after the implementation of the new plan, another member of staff falls ill; so he must modify his plans, and determine how the work can be rescheduled with two staff away. Much of such routine planning will be an automatic process, requiring little conscious thought on the part of the manager, as his plans and decisions will be based largely on past experience with similar, or even identical, problems.

5.3.2 CONTINGENCY PLAN

According to Dan Power et al (1986), “Contingency planning is a systematic approach to identifying what can go wrong in a situation. Rather than hoping that everything will turn out OK or that "fate will be on your side", a planner should try to identify contingency events and be prepared with plans, strategies and approaches for avoiding, coping or even exploiting them”. Therefore, Contingency plan is a plan devised for an outcome other than in the usual (expected) plan. So, it can be defined as developing a Good 'Plan B'. It is often used for risk management when an exceptional risk that, though unlikely, would have catastrophic consequences.

During times of crisis like war, tsunami, cyclones, tornadoes, flood, draught, etc. contingency plans are often developed to explore and prepare for any eventuality. Contingencies are relevant events anticipated by a planner, including low-probability events that would have major impacts. Contingency planning is a "What if?" skill important in all types of planning domains, but especially in contested and competitive domains. The objective of contingency planning is not to identify and develop a plan for every possible contingency. That would be impossible and a terrible waste of time. Rather, the objective is to encourage one to think about major contingencies and possible responses. Few situations actually unfold according to the assumptions of a plan. However, people who have given thought to contingencies and possible responses are more likely to meet major goals and targets successfully. The following questions can help develop contingency plans:

- What events may occur that require a response?
- What disasters might happen during execution of the plan?
- What is the worst case scenario of events for the situation?
- What scenarios are possible for the situation?
- What event would cause the greatest disruption of current activities and plans?
- What happens if costs of the plan are excessive? what happens if delays occur?
- What if key people leave the organization?

- What are the expected moves of antagonists and competitors?
- Who or what might impede implementation of the plan?

5.4 WAREHOUSE ORGANIZING

Organizing is the second function of management and refers to formal arrangement of jobs within an organization (Steven P. Robbins Mary Coulter, 2005). Organizing can be thought of as the process of bringing together physical, financial and human resources and developing productive relationship amongst them for achievement of organizational goals. According to Henry Fayol, “to organize a business is to provide it with everything useful for its functioning i.e. raw material, tools, capital and personnel’s”. Management must organize all its resources in order to implement the course of action it determined in the planning process and create a mechanism to put plans into action. Organizing as a process involves:

- Identification of activities.
- Classification of grouping of activities.
- Assignment of duties.
- Delegation of authority and creation of responsibility.
- Coordinating authority and responsibility relationships.

Once the plans have been formulated, to organize a business first of all it requires identifying the activities and grouping them based on their classification to ensure that the objectives are achieved as planned. Organizing, then, can be seen as the process of ensuring the right staff, the right materials and the right machines are in the right places at the right times and in the right quantities so that work will proceed in accordance with the formulated plans, without delays, hold-ups or stoppages.

In determining the internal structure, management must look at the different divisions or departments, the coordination of staff, and what is the best way to handle the necessary tasks and disbursement of information within the company. Management will then divide up the work that needs to be done, determine appropriate departments, and delegate authority and responsibilities.

People within the organization are given work assignments that contribute to the company’s goals. Tasks are organized so that the output of each individual contributes to the success of departments, which, in turn, contributes to the success of divisions, which ultimately contributes to the success of the organization.

Assigning work and granting authority are two important elements of organizing. Organization design is the process of deciding how organizations should be structured and function. Assignment of duties in the best possible manner is known as staffing which includes manpower or human resource planning. Staffing involves selection, recruitment, induction and positioning right people for the job at right time, and always secures a sufficiently skilled and educated workforce in the organization. It also includes decisions on remuneration packages, performance appraisals, training, retraining, development, mentoring, counseling, and designing and administering the motivational packages. Managers must organize all its resources particularly human resources in an efficient manner and structure and align the activities of the organization.

Delegation of authority is an elementary art of management. In every organization, the ultimate authority must rest somewhere, and there must be a clear chain of direct authority relationships from superior to subordinate throughout. One of the difficult problems of management structure is the choice between a narrow 'span of control' and a 'flat' organizational structure. Span of control refers to the number of subordinates managed by a superior.

Organizing and co-coordinating are very closely linked, and frequently coordinating is an essential continuation of organizing. Coordinating involves ensuring that all efforts move smoothly together in the same direction. It ensures that although different staff might perform different work, all their efforts mesh smoothly together and are directed towards achieving the common objectives.

Managers must harmonize the procedures and activities performed by the company, meaning that every activity of each organizational unit should complement and enrich the work of another. Co-ordination is just as essential in top management as it is at junior management and supervisory levels. For example, the managing director or general manager must ensure that the efforts and activities of all the different departments of an enterprise are in harmony, and in co-operation; as we said earlier, there is no point in, for example, the sales department endeavoring to sell items not yet in stock or in production! Good relations and communications between departmental managers must be developed and fostered so that they all work together in concert. At the other end of the scale, a junior manager, supervisor or foreman must co-ordinate the work of his subordinates so that although different people

might be performing different tasks, work will, when necessary, flow smoothly and continuously from one person to the next.

5.4.1 ORGANIZATIONAL CULTURE

Through the process of getting organized, management will determine the internal organizational structure; establish and maintain relationships, as well as allocate necessary resources. Organizing or the formal arrangement of job varies from organization to organization depending on the organizational culture – the pattern of values, norms, beliefs, attitudes and assumptions that may not have been articulated but shape the ways in which people in organizations behave and things get done. Mintzberg defined an organization's structure as 'the sum total of the ways in which it divides its labor into distinct tasks and then achieves co-ordination among them'. Good organization structure does not by itself produce good performance, but a poor organization structure makes good performance impossible.

A range of variables may influence structural choices of an organization, including the strategic objectives of the organization; its task or 'business'; its technology; its size and geographical dispersion; its culture and management style – and its external environment. In addition, there are internal organizing factors such as: centralization/decentralization and span of control. Many researchers such as Harrison, Handy, Schein and Williams, have attempted to classify or categorize organizational culture as a basis for the analysis of cultures in organizations and for taking action to support or change them. Most of these classifications are expressed in four dimensions as summarized below (Michael Armstrong, 2009):

Power-oriented: The power oriented culture is one in which organizations try to dominate their environment and those exercising power strive to maintain absolute control over subordinates. There is a central power source that exercises control and few rules or procedures. This culture is responsive to personality rather than expertise and the atmosphere is competitive, power-oriented and political.

People-oriented: The people oriented or person culture is one in which the individual is the central point. Individuals are expected to influence each other through example and helpfulness. The organization exists primarily to serve the needs of its members.

Task orientation: Task orientation, which focuses on task accomplishment. Authority is based on appropriate knowledge and competence. In this culture the aim is to bring together

the right people and let them get on with it. Influence is based more on expert power than in position or personal power. The culture is dynamic, adaptable focus on competency and teamwork is important.

Role-oriented: In the role culture work is controlled by procedures and rules and the role, or job description, is more important than the person who fills it. Power is associated with positions not people and balanced between the leader and bureaucratic structure. The environment is likely to be stable and roles and rules are clearly defined.

It is not possible to say that one culture is better than another, only that a culture is to a greater or lesser extent appropriate in the sense of being relevant to the needs and circumstances of the organization and helping rather than hindering its performance. However, embedded cultures exert considerable influence on organizational behavior and therefore performance. If there is an appropriate and effective culture it would therefore be desirable to take steps to support or reinforce it. If the culture is inappropriate, attempts should be made to determine what needs to be changed and to develop and implement plans for change.

5.5 LEADING IN WAREHOUSE

The third function of management is leading which is also referred to as influencing, motivating or directing. It is one of the most important functions of management to translate company's plans into execution. CIPS define leadership as the process of influencing others to work willingly towards an organization's goals and to the best of their capabilities. Mullins defines leading as 'a relationship through which one person influences the behavior or actions of other people'.

Leadership is about coping with change. It is that inert-personnel aspect of management which deals directly with energizing, creating a sense of direction and communicating a vision. Effective leading requires the manager to guide, supervise, inspire and motivate subordinates, communicate effectively, and effectively use power for the achievement of organizational goals. It can, essentially, only be exercised over people. It requires the manager to coach, assist, and problem solve with employees. If managers are effective leaders, their subordinates will be enthusiastic about exerting effort toward the attainment of organizational objectives. Leading has following elements:

- o **Directing** – It aims at achieving the best not just out of an individual but achieving the best through the groups or teams of people through team building efforts. It also means coordinating various people and their activities. The commanding of subordinates should always be consistent with company policies, and every manager should treat subordinates in line with the standards of the company.

- 0 **Supervision** – implies overseeing the work of subordinates by their superiors. It is the act of watching & directing work & workers. Managers must supervise subordinates in their daily work, and inspire them to achieve company goals. Likewise it is the responsibility of managers to communicate company goals and policies to subordinates.
- 0 **Motivation** – means inspiring, stimulating or encouraging the sub-ordinates with zeal to work. Positive, negative, monetary, non-monetary incentives may be used for this purpose. The purpose of motivating employees is to increase productivity. Employees that are highly motivated generally go above and beyond in their job performance, thereby playing a vital role in the company achieving its goals. For this reason, managers tend to put a lot of focus on motivating their employees.
- 0 **Communications** – is the process of passing information, experience, opinion etc from one person to another. It is a bridge of understanding. It is the responsibility of managers to communicate company goals and policies to subordinates. Effective communication is vital in maintaining a productive working environment, building positive interpersonal relationships, and problem solving. Understanding the communication process and working on areas that need improvement help managers to become more effective communicators. The best way to find areas that need improvement is to periodically ask themselves and others how well they are doing.

To become effective at leading, managers must first understand their subordinates' personalities, values, attitudes, and emotions. Therefore, the behavioral sciences have made many contributions to the understanding of this function of management. Personality research and studies of job attitudes provide important information as to how managers can most effectively lead subordinates.

There was a time when the calling of the manager and that of the leader could be separated. For example, a foreman in an industrial-era factory probably didn't have to give much thought to what he was producing or to the people who were producing it. His/ her job was to follow orders, organize the work, assign the right people to the necessary tasks, coordinate the results, and ensure the job get done as ordered. The focus was on efficiency. But in the new economy, where value comes increasingly from the knowledge of people and where workers are no longer undifferentiated cogs in an industrial machine, management and leadership are not easily separated. People look to their managers, not just to assign them a task, but to define for them a purpose. In addition, managers must organize workers, not just to maximize efficiency, but to nurture skills, develop talent and inspire results. Therefore, in the modern business world the term 'manager' and 'leader' are often used interchangeably – although 'leader' is now more fashionable term.

The late management guru Peter Drucker was one of the first to recognize this truth, as he was to recognize so many other management truths. He identified the emergence of the “knowledge worker”, and the profound differences that would cause in the way business was organized. With the rise of the knowledge worker, “one does not ‘manage’ people”, Mr. Drucker wrote. “The task is to lead people and the goal is to make productive the specific strengths and knowledge of every individual” (Management in the Purchasing Function). There are a number of reasons why it might be thought important for a manager to become a leader. The reasons could include:

- Leaders energize and support change, which is essential for survival in highly competitive and fast-changing business environments.
- Leaders secure commitment; mobilize the ideas, experience and motivation more than mere compliance from the employees – which contributes to innovation and improved quality and customer service. Commitment-based system has significant advantages over a compliance-based system, in terms of loyalty, adaptability, performance improvement and resource utilization.
- Leaders can think ‘outside the box’ of the institutional framework, for greater flexibility and creativity.
- In the modern business environment, there is competition for skilled labor in many sectors, coupled with high expectations among the pool of skilled labor as to the quality of working life. Managers may need to exercise leadership in order for the organization to attract and retain staff.
- Contemporary systems and structures utilize such concepts as multi-skilling and matrix structures to maximize the flexible use of human resources. A culture of control based on interpersonal skills is more likely to adapt than a managerial framework of formal authority and defined functions.
- A manager who is a leader may not have to confront competition and resistance from informal leaders emerging within his team.

An effective leader must be a good manager and a good manager effectively must be a good leader. Whitten and Cameron argue that, the distinction between managers and leaders is no longer very useful. Managers cannot be successful without being good leaders, and leaders cannot be successful without being good managers.

5.6 WAREHOUSE CONTROLLING

Warehouse controlling is the last of the four functions of management and like other management function it is an ongoing process. Theo Haimann defined controlling as the process of checking whether or not proper progress is being made towards the objectives and goals and acting if necessary, to correct any deviation; and according to Koontz &

O'Donell, controlling is the measurement & correction of performance activities of subordinates in order to make sure that the enterprise objectives and plans desired to obtain them as being accomplished.

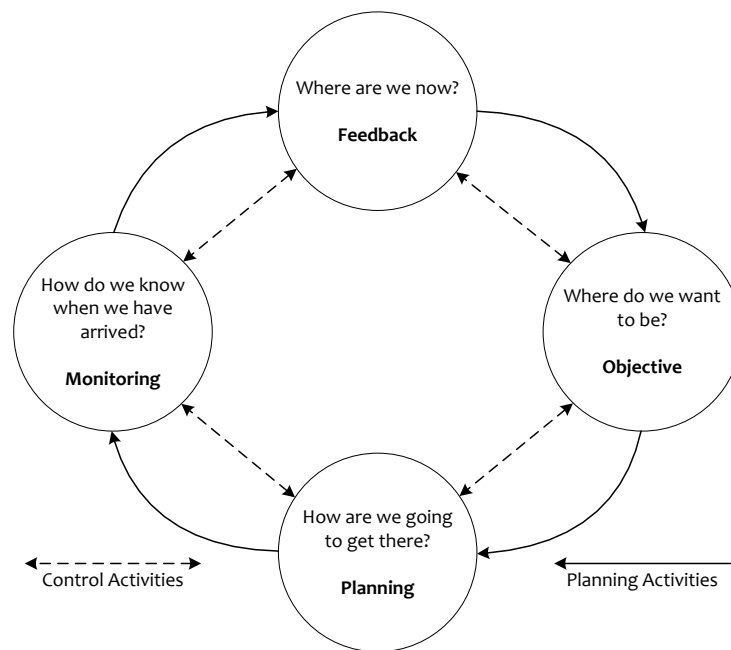


Figure 5.7 The Planning and Control Cycle
(Source: Logistics & Distribution Management, 2011)

Effective controlling requires the existence of plans, since planning provides the necessary performance standards or objectives. Figure 5.5 illustrates a typical framework for planning and control cycle of a business. Within this framework it can be seen that the work of all staff must be supervised and checked (and further instruction, guidance or training given when required); and that all operations or processes must be checked or inspected, and performances measured against the targets set in the plans and against set standards.

Controlling requires a clear understanding of where responsibility for deviations from standards lies. It ensures that, employees perform the work allocated to them in the ways laid down and with no wastage or duplication of time, effort or materials. It comprises supervising the people employed, checking their work and the machinery and equipment used, to ensure that the end products are the desired objectives; it includes the recording of performances to provide a guide for future similar activities.

5.6.1 SUPERVISING

Controlling involves much more than simply instructing a given number of employees to perform work; they must be supervised and managed so that their efforts achieve the desired results and this requires that they be motivated, checked, guided, taught and encouraged. All employees are human beings, with human feelings, and their efforts cannot simply be switched on or off like a light bulb; and they look towards, indeed depend upon, their managers for direction.

5.6.2 MAINTAINING RECORDS

An important part of the function of controlling entails the maintaining of records of performance. Such records, whether concerning receipts, issues, sales, production, output, etc., are vital as a guide to future planning and in the setting of new or revised standards, stock levels, etc.

5.6.3 STEPS OF CONTROLLING

The warehouse controlling function involves the process of identifying whether the plan has been adhered to; what deviations have occurred and why; so that remedial actions can be speedily taken. An efficient system of control helps to predict deviations before they actually occur. Therefore, the function of controlling can be arranged in following steps:

1. Establishing performance standards or Benchmarking

It is necessary to establish performance standards or benchmark the warehouse function to supervise and manage it properly. Key performance indicators (KPIs) could be used as the performance standard recognized and set up in advance for comparing performance. When the warehouse is operational, it need to meet KPIs in areas such as costs and customer service, as follows:

Cost

- Staff, including overtime and other payments
- Building and site
- Equipment and other resources
- Maintenance
- Pallets and pallet repair
- Usage of packing materials and other consumables
- Services, including any bought-in services

Customer Service

- Stock availability in the warehouse
- Order lead-time
- Percentage of orders completed on time
- Percentage completeness of order fill
- Number of outstanding back orders
- Damaged stock
- Returns and customer complaints

A dictionary definition demonstrates the basic concept of benchmarking as a standard point of reference against which things can be assessed. The basic idea of benchmarking is that, a comparison of existing process against some form of standard (internal or external) may identify areas where improvements are possible. The objectives of benchmarking are to:

- Understand and evaluate the current position of a business or organization in relation to "best practice/ industry leaders";
- Identify areas where improvements are possible; and
- Identify means of performance improvement.

Performance standards are often stated in monetary terms such as revenue, costs, or profits, but may also be stated in other terms, such as units produced, number of defective products, or levels of customer service.

Although controlling is often thought of in terms of financial criteria, managers must also control production/operations processes, procedures for delivery of services, compliance with company policies, and many other activities within the organization.

2. Measurement of actual performance

Warehouses could be the profit centre of an organization if the warehousing function adds value to the business. Therefore, it is necessary to measure the performance of warehouse function in terms of added value that it makes for the organization.

The measurement of performance can be done in several ways, depending on the performance standards, including financial statements, sales reports, production results, customer satisfaction, budget, performance audit and formal performance appraisals. Managers at all levels engage in the managerial function of controlling to some degree.

3. Comparing actual performance against standards

Comparison of actual performance with the pre established performance norms or standard is essential for finding out deviation if any. In today's competitive business world, it is no longer enough to think we are doing a good job, warehouse operations needs to be measured and evidenced to compare against some key performance indicators (KPIs) or preset benchmark (what was planned to happen actually does happen) and, if necessary, ensures that corrective action is taken. KPIs allow for a comparison with past performance and, if benchmarked, with other in-house operations or outside competitors.

4. Taking corrective or preventive action when necessary

The control process, as with the other three, is ongoing. If there is any deviation between the actual performance and the pre set standard, businesses requires determining the next action plan and modifications for achieve the desired performance parameters. Through controlling, management is able to identify any potential problems and take the necessary preventative measures. Management is also able to identify any developing problems that need to be addressed through corrective action.

Management should not lower standards in an effort to solve performance problems. Rather they should directly address the employee or department having the problem. Conversely, if limited resources or other external factors prohibit standards from being attained, management should lower standards as needed.

The managerial function of controlling should not be confused with control in the behavioral or manipulative sense. This function does not imply that managers should attempt to control or manipulate the personalities, values, attitudes, or emotions of their subordinates. Instead, this function of management concerns the manager's role in taking necessary actions to ensure that the work-related activities of subordinates are consistent with and contributing toward the accomplishment of organizational and departmental objectives.

5.7 CONCLUSION

In order for management to be considered successful, it must attain the goals and objectives of the organization. This requires creative problem solving in each of the four functions of management. More so, success requires that management be both effective and efficient. Therefore, it needs to not only accomplish those goals and objectives, but do it in a way that the cost of accomplishment is viable for the company.

The management functions of planning, organizing, leading, and controlling are widely considered to be the best means of describing the manager's job as well as the best way to classify accumulated knowledge about the study of management. Although there have been tremendous changes in the environment faced by managers and the tools used by managers to perform their roles, managers still perform these essential functions.

CHAPTER 6

PRESENT WAREHOUSE MANAGEMENT AT REB

6.1 INTRODUCTION

The Rural Electrification Board (REB) is a semi-autonomous government agency working in electrification of rural Bangladesh and is also active in the field of diffusion of solar energy in this country. It implements the programs of distribution of power in rural areas and constructs power distribution line and power sub-stations through Rural Electric Societies (*Palli Biddiyut Samity* - PBS) on the principle of co-operative. For that reason, each year REB requires substantial amount of materials worth billions for the construction and maintenance of the distribution lines and sub-stations. These materials need to be stored, managed and re-distributed as per requirement very efficiently and effectively where the warehouse function can play a vital role to add value to the supply chain.

The scope of this thesis is only limited to the Central Warehouse, Dhaka (CWD). Usually all the REB warehouses/ stores are operated and managed in a similar fashion within a defined policy framework and under the control of the directorate of 'Clearing, Storing and Movement (CS&M)'. The organizational hierarchy for central warehouses of REB is shown in Figure 6.1.

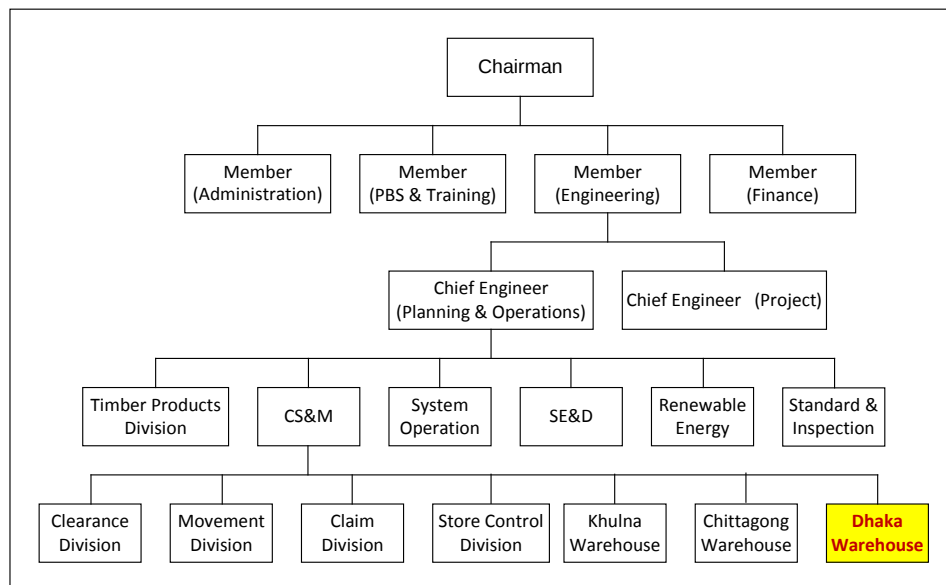


Figure 6.1: Organizational Hierarchy of Central Warehouses of REB

As uniform rules, guidelines and principles are applied to all the warehouses, study of CWD will ultimately reveal overall picture of warehouse management at REB. It will give an overview of the whole warehousing process of REB and help to identify issues to address and ways to improve the function.

6.2 MATERIALS MANAGEMENT CONCEPT OF REB

Material management is basically an organizational concept that is designed to enhance co-ordination and control of various activities related with the use of materials in an organization. The specific activities of materials management is shown in Figure 6.2.

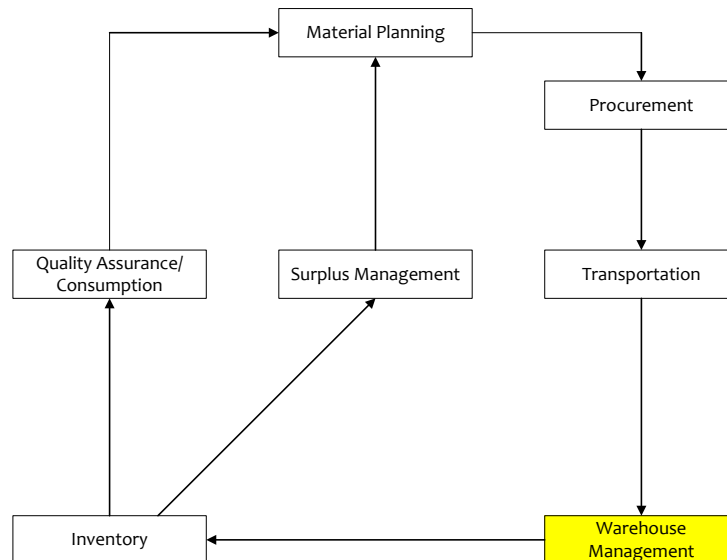


Figure 6.2 Activities of Materials Management
(Source: Warehouse Management for Engineers, 2001)

Material planning is the activity to decide which materials need to be procured; how much materials needs to be procured; who will procure those materials; how the materials are to be procured; when these materials need to be procured; and how will the quality be ensured.

Material planning serves as co-ordination between purchasing and construction and maintenance division. Timely delivery of materials is of great significance here. If materials do not arrive on time, construction and maintenance of power lines and substations in full may not be achieved. The whole material planning process of REB can be shown by Figure 6.3.

Procurement is the activity to collect the materials at the right time in right quality as well as right quantity with the right price from the right source to the right place for the right service or use. The REB procurement entails functions involved in source selection, soliciting bids, cost price analysis, negotiation, contract, terms and conditions, and contract management.

Transportation is the activity for selecting and ensuring the mode of conveyance used for the supply of materials. A transportation cost significantly affects the cost of materials. If shipment fails to arrive when scheduled, serious operating delays may ensue. General

efficiency of a total supply chain can be affected with the type of cooperation extended by carriers.

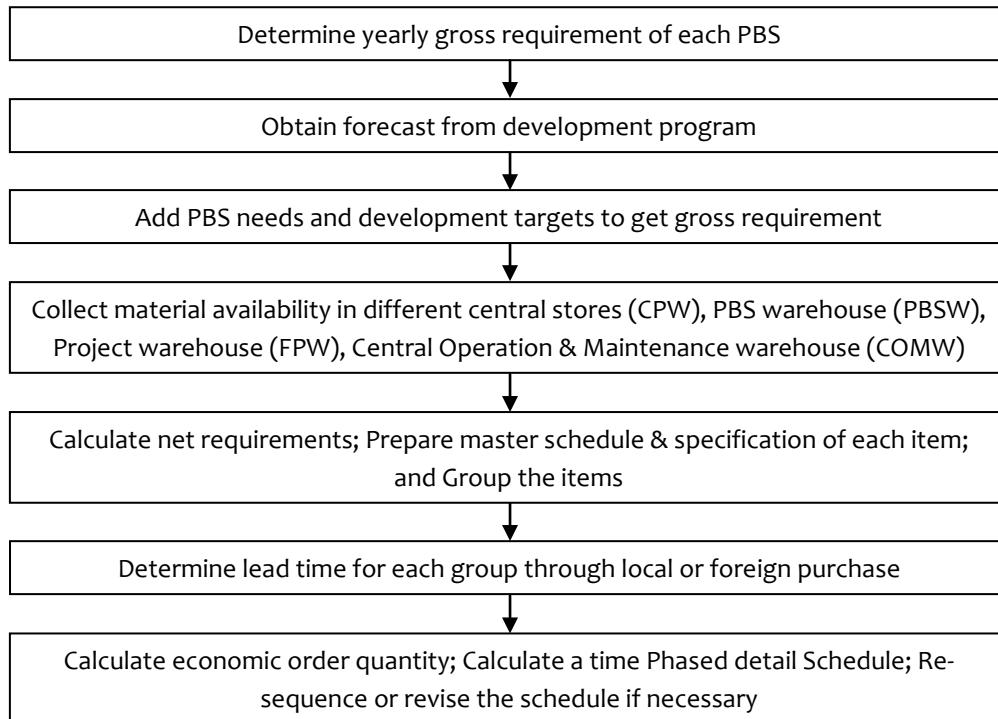


Figure 6.3 Steps of Material Planning
(Source: Warehouse Management for Engineers, 2001)

In the context of REB, warehouse management consists of different functions related to receiving materials, storage and issue of materials. This materials management activity is discussed in the following sections.

Inventory is the process of listing the materials with the related information of the materials. It provides actual quantity of the materials and allows finding deviation from the stock. Inventory is necessary to provide continuity of procurement, to find out consumption rate etc. Inaccurate inventory may result in too small or too large procurement, which increases the cost in many ways.

Quality assurance is the assessment of the suitability of the item supplied in satisfying the particular need at hand. Accordingly, users and buyers attempt to develop a material specification in which the quality characteristics of the specified material match closely with the quality characteristics needed to satisfactorily fulfill the functional requirement of the job. So, quality assurance becomes a part of the task of material management. Quality is necessary

for user satisfaction, whether the user is the immediate purchaser, an intermediate processor or handler or the ultimate customer.

Even with sound management, there may be unneeded (surplus) assets in an organization. These can come from process changes, normal experimentation with new things, overbuying to avoid stock-outs, forecasting errors, cut pieces from execution of work, damaged equipments, damaged or obsolete stock, etc.

Therefore, effective materials management should be designed to achieve the following activities:

- o Ensure identification, supply, storing and quality assurance of materials used in the organization,
- o Proper co-ordination within the planning, purchasing and warehousing functions within the departments,
- o Maintain a sufficient size of inventories for successful achievement of construction target and also support the efficient and smooth operations and maintenance work of the project/ PBS.
- o Maintain a minimum investment in inventories to maximize profitability,
- o Make better utilization of control tools, to cut across functional lines,
- o Make profit contribution that is measurable because of direct management of inventory, procurement & distribution and to contribute cost reductions in all areas.

REB has developed all policies and procedures to ensure achievement of the stated objectives. Policy instruction 100-33 and 100-46 serves as the outline for the materials management functions.

6.3 WAREHOUSE MANAGEMENT IN REB

The concept of warehouse emerges when the consumption of materials is delayed after procurement. Warehouse management is the process of coordinating the incoming goods, the subsequent storage and tracking of the goods, and finally, the distribution of the goods to their proper destinations. As discussed in earlier chapters, there are four main functions of management or warehouse management which are planning, organizing, leading, and controlling.

Every organization, regardless of size, has developed and implemented its own management concepts in order for it to run smoothly and accomplish the vision, goals and objectives it has set forth. REB considers warehouse management as a part of its material management activity and its warehouse management includes activities such as planning, procuring, supplying and managing materials in the warehouse. In a broad sense, warehouse management activities are spread over five REB directorates which are:

- o Directorate of Program Planning
- o Directorate of Material Planning standard & Specification Standard (MPSS)
- o Directorate of Procurement
- o Directorate of Inspection and Testing (I&T)
- o Directorate of Clearing, Storage & Movement (CS&M)

6.4 PLANNING

The Program Planning Directorate is responsible for comprehensive planning to accomplish the vision, goals and objectives of this organization. This comprehensive planning includes detailed proposal about how many km of electrical distribution line will be constructed, how many substations will be constructed, which areas will be included, duration/length of the project, etc based on its master plan. After preparing the draft project proposal it requests MPSS to prepare the bill of material and estimated cost for fund requirement.

MPSS prepares the specification and the bill of materials (BOM) to be required for the implementation of the project and send it to Program Planning. Program Planning prepares the development project proforma (DPP) on the basis of these data. It searches for financial sources (Foreign/ Local) to implement the program through communication and coordination with donor agencies for funding.

After approval of the DPP from Planning Ministry (through MoPEMR), Program Planning allocates annual budget for the project based on the availability of budget. Based on this budget allocation and BOM, MPSS prepares estimated cost of each material and hence the cost of the project based on the recent market price (e.g. last purchase price or price listed on London Metal Exchange); the annual procurement plan (APP); price schedule; and delivery schedule for the project.

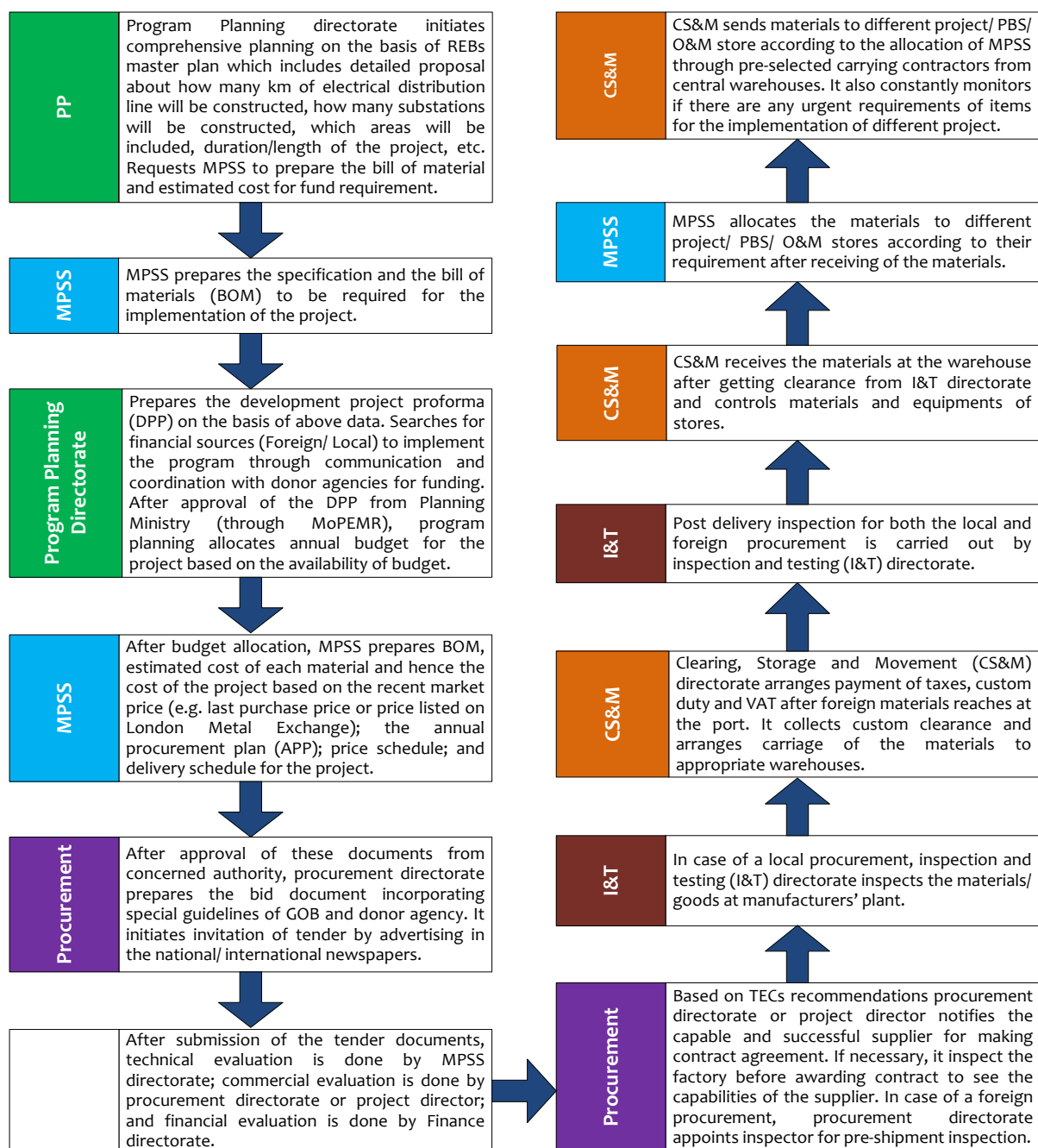


Figure 6.4 Sequences of Activities in Warehouse Management of REB

6.5 PROCURING

The Procurement Directorate is responsible for procuring the required materials, equipments and services. After getting approval of the above mentioned documents from concerned authority, Procurement Directorate prepares the bid document incorporating special guidelines of GOB (PPR 2008) and donor agency based on the documents. It initiates invitation of tender by advertising in the national (for local procurement) or international news papers (for international procurement), REB website and CPTU website.

Every year REB spends a lot of money for material procurements. Almost 90% of its total expenditure is spent for material procurement which are primarily stored in three central ware houses of REB. REB's last ten years material procurement cost data is shown in Figure 6.5.

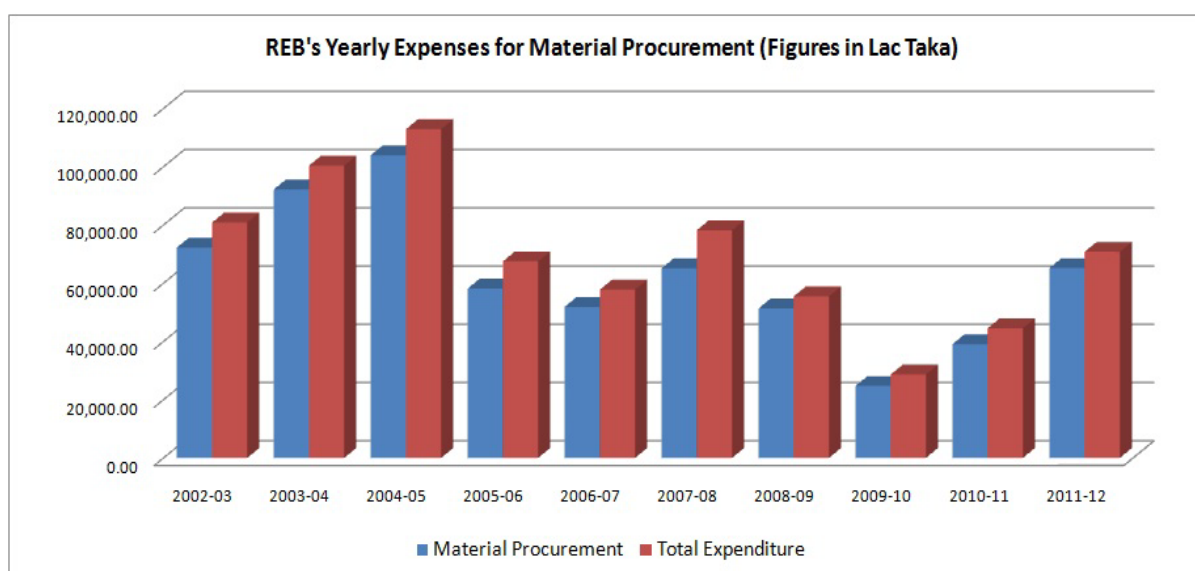


Figure 6.5 Yearly Expenses for Material Procurement
(Source: Yearly RADP Allocation & Expenditure Report published by Directorate of Finance)

The stockholding cost includes four basic elements:

- ⇒ Cost of capital tied up in inventories.
- ⇒ Cost of **obsolescence**, deterioration, insurance, etc.
- ⇒ Administrative costs such as staffing, stock control systems, etc.
- ⇒ Warehousing costs.

As a semi-autonomous government agency REB is bound to follow public procurement guidelines set by the Central Procurement Technical Unit. The CPTU was established in April 2002 as a unit within the Implementation Monitoring and Evaluation Division (IMED) of the Ministry of Planning. It is a permanent institution of the government, funded under the revenue budget and established for carrying out the following purposes:

- Implementation and monitoring compliance with the procurement act and rules;
- Capacity building of government employees for efficient and effective utilization of public money through better procurement practice;

- Propose any Amendment to the Act, Rules or other Documents which appears necessary in the light of international practices and experience gained in course of the Public Procurement process in Bangladesh;
- Issue guidance and instructions regarding the interpretation and implementation of these Rules and other Documents issued by it and give, upon request from the concerned Procuring Entity or Tenderer, advice and assistance to Procuring Entities without, however, diminishing the responsibility of a Procuring Entity;
- Prepare and distribute standard Documents to be used in connection with public Procurement;
- Performing any other responsibilities as prescribed in the act and rule.

REB pursues an appropriate tendering process as instructed by CPTU for each procurement. Tender documents submitted by the suppliers are evaluated in three stages: technical evaluation is done by MPSS directorate; commercial evaluation is done by procurement directorate or project director; and financial evaluation is done by Finance directorate.

Based on TECs recommendations procurement directorate or project director notifies the capable and successful supplier for making contract agreement. If necessary, it inspect the factory before awarding contract to see the capabilities of the supplier.

In case of a foreign procurement, procurement directorate appoints inspector for pre-shipment inspection and in case of a local procurement, inspection and testing (I&T) directorate inspects the materials/ goods at manufacturers' plant.

6.6 SUPPLYING

This activity is the responsibility of Clearing, Storage and Movement (CS&M) directorate. The roles of CS&M directorate are to:

- Make insurance policy of imported materials;
- Arrange clearance from customs department of GOB by paying taxes, CD, VAT, etc. after foreign materials reaches at the port;
- Arrange movement of materials and equipments from port to the central warehouse through C&F agent;
- Appointment of Clearing and forwarding Agent and enlist surveyors as per REB guideline. It ensures conducting of “on board and in warehouse” surveys by these surveyors after arrival of materials at port and warehouse respectively;

- o Requests I&T directorate for their inspection;
- o Make insurance claim as per survey reports against damage and lost materials;

6.7 MANAGING MATERIALS IN THE WAREHOUSE

Managing materials in the warehouse includes receiving the materials; providing storing facilities; re-distributing the materials as per requirement; maintaining its infrastructure; ensure safety and security; and recording and reporting. To ensure these tasks, REB has three kinds of warehouses under CS&M directorate. They are:

Central Project Warehouses (CPW): also know as Central Warehouse (CW). There are three CPWs or CWs located at Dhaka, Chittagong and Khulna. It keeps the materials and equipments that are procured against different projects under ADP and controlled by CS&M directorate.

Central Warehouse, Dhaka is located at Savar, Dhaka. It is headed by a manager (Deputy Director). Office of the Manager (Store) is in the premise of Central Store and his duties and responsibilities are to coordinate the activities of Central Store and other stores. Manpower set-up for this warehouse is as follows:

Table 6.1 Manpower set-up for Central Warehouse, Dhaka

SL	Designation	No. of Posts	No. Employees
01	Deputy Director (DD)	01	01
02	Assistant Director (AD)	01	00
03	Store Keeper	02	01
04	Assistant Store Keeper	02	03
06	Store Helper	02	02
06	Security Supervisor	01	01
07	Security Guard	03	03
08	Ansar (Including 01 PC)	06	06
09	Cleaner (On Master Roll)	00	01

Central operation and maintenance warehouse (COMW): The COMWs keeps the materials and equipments that are procured by seed money or by transferring or purchasing from CPW or FPW with the approval of REB on credit or cash for supply of materials to

PBS store. These materials and equipments are controlled by System Operation (SO) directorate.

Field Project Warehouse (FPW): The FPWs keeps the materials and equipments that are meant for issuing materials to work orders of REB funded GOB approved projects as and when required. FPWs are located at each PBS Head Quarters across the country. These stores are operated by Executive Engineer (XEN) of project division and controlled by Superintending Engineer (SE).

There is another kind of warehouse related to REBs operation. The PBS Warehouse (PBSW) which keeps the materials and equipments that are meant for issuing to work orders of PBS operation & maintenance (CO&M) and PBS funded development works.

6.7.1 RECEIVING MATERIALS

Receiving activity identifies the most incoming materials and notifies the concern departments of the arrival and condition of the material. Upon arrival of the materials and equipments at warehouse premises post delivery inspection for both the local and foreign procurement is carried out by inspection and testing (I&T) directorate. It ensures conformity of the materials with the specification document.

Clearance, Storage & Movement (CS&M) directorate receives the materials at the warehouse after getting clearance from I&T directorate and arrange release of 10% retention money of the supplier after successful completion of supply. It records overages, shortage, damaged and incorrect materials on the receiving copies provided for purchasing order or material received report. It also records the receipt, as partial or complete on receiving copies of the purchasing order or material received report and notifies other concerned departments regarding receipt of the shipment, its quantity, conditions and arrival time.

6.7.2 PROVIDING STORING FACILITIES

After receiving the materials and equipments at Central Warehouse, the task of storing starts which includes keeping the materials and equipments in an appropriate store; protect those from natural and manual destruction; and making an inventory and providing them to the user at necessity. The CS&M directorate provides storage facilities for equipment and materials at central warehouse and provides guideline to field project warehouse (FPW). It also controls materials and equipments of stores.

6.7.3 RE-DISTRIBUTING THE MATERIALS AS PER REQUIREMENT

Materials are purchased, received, stored either to make operation & maintenance work or to make construction work. To achieve this goal, the materials are required to be used. MPSS directorate allocates the materials to different project/ PBS/ O&M stores according to their requirement after receiving of the materials. CS&M directorate sends these materials to different project/ PBS/ O&M store according to that allocation through pre-selected carrying contractors from central warehouses and also monitor the urgent requirements of items for the implementation of different projects/ PBSs.

6.7.4 MAINTENANCE OF WAREHOUSE INFRASTRUCTURE

Maintenance of warehouse infrastructure includes regular checkup of its physical infrastructure and takes appropriate measure to address any problem identified. CS&M directorate arranges physical inventory of central warehouse as per REB instruction 600-17. It also ensures routine maintenance as well as preventive maintenance handling equipments, civil installations, etc.

6.7.5 ENSURING SAFETY AND SECURITY

Ensuring safety and security of the materials and equipments stored in the warehouse, and the manpower involved in the warehouse is also an important function of warehouse management. Ensuring safety and overall security of the warehouse is the responsibility of CS&M directorate. In case of Dhaka Central Warehouse, security is ensured by the following personnel:

Table 6.2 List of security personnel for Central Warehouse, Dhaka

SL	Designation	No. of Posts	No. Employees
01	Security Supervisor	01	01
02	Security Guard	03	03
03	Ansar (Including 01 PC)	06	06

6.7.6 RECORDING AND REPORTING

Keeping records and reporting to the authority is the last and important part of the warehouse management where the quantity of materials received and distributed at the

reporting period is mentioned. It provides the materials management personnel the exact picture of the materials consumption and surplus or shortage situation. CS&M ensure whether the central warehouses are maintaining store tickets and ledgers properly in issuing, returning, etc. of the materials. It ensures maintaining of all sorts of files related to receiving, issuing, returning; and supporting papers of the same, voiding ticket etc. as per REB guideline.

6.8 CODING AND CLASSIFICATION OF MATERIALS

A significant coding system is a system for identification of items and components by symbols, letters, numbers or a combination of these elements, whereby each digit or sequence gives a complete and unique reference which cannot be confused with another and can be recorded, retrieved and recognized throughout the enterprise (Storage and Distribution, 2010).

The advantages of a significant coding system to an organization are:

- o It avoids repeated use of long descriptive titles;
- o It provides a unique code for each item and accurately identifies them;
- o It can help in standardization and variety reduction and also prevent duplication of items;
- o It can be taught and thus can provide the organization with a common language;
- o It can be used to categories goods which forms a convenient basis for sorting and recording of documents;
- o It simplifies recording and is convenient for central analysis of different warehouse records;
- o It is an aid to all activities of materials management and control and in many cases a prerequisite of, stock control systems;
- o It can be used for financial record keeping;
- o It can be employed for efficient order picking;
- o It can be used by a warehouse location system;
- o The system is flexible allowing for expansion and contraction;

Item number or code for any REB materials, tools and equipments are issued by MPSS directorate and used under constant control. Each code number has separate specification of materials. REB item numbering of the materials is done according to REB instruction 600-8.

If one material becomes obsolete or not used anymore, its code number remains for that item and it must never be used for any other materials. For a substitute for the previous items in the stock an item must be completely interchangeable and acceptable or a new item number is required. When new items of materials are procured MPSS directorate assigns a new identification number for that item and circulates it to each PBSs, project divisions, Finance directorate and other departments. For example, a typical number is “B-2” indicates a hardware item known as “Pole Top Pin” and used to fit 11 KV insulator at the pole top. The first one or two alphabet indicate material groups and the last two or three numerical digits are the unique sequence within the group. A list of the group code is given below:

Table 6.3 List of Material Group Codes

Description of Group	Code
Hardware	B
Insulator	C
Conductor	D
Armor Rod, Tape, Line Guard, Rust Removal, Preventive, Grip	E
Cable (Terminator, Splice, Sleeve, Preformed Support)	F
Transformer, Breaker, Sensor	G
Fuse Link, Cutouts, Arrester, Sectionalizer, Re-closer, Switch	H
Connector, Sleeve, Clamp, Transformer pin terminal, Adapter, Compound	I
Meter (Press Bulb & Meter related Spares)	J
Regulator, Capacitor	K
Street Light Assembly (Lamp, Photocell control, Refractor, Shade)	L
Static Converter	M
Miscellaneous Equipment	ME
Wire (Steel, Guy)	N
Pole (Wooden, SPC)	R

Description of Group	Code
Test Instrument	TI
Tools Lineman	TL1
Cross Arm	X
Log, Plug, Post (Fence)	Z

6.9 OBSOLETE AND REDUNDANT STOCKS

Management of stock means minimizing areas of waste. One area that often causes problems in organizations is that of obsolete and redundant stock.

- o **Obsolete** stock is stock that has become outdated and is no longer appropriate for current requirements. In the context of REB, these items are known as “Dead Items” and refer to the items that are used before but not used now. For example, item B-69 Guy Hook, B--61 Guy Plate and B-66 Pipe Spacer are dead items in REB system now.
- o **Slow Moving Items** are the items that are required very less in a year in comparison to the use of other materials but may be used in future. For example, B-43 Brace Steel Side Arm, X-3 Cross Arm (12 ft), Z-4 log Stabilizer (4 ft), etc.
- o **Substitute Items** are the items that are used instead of a particular item are called substitute items. The items which are to be used instead of an item must have the suitability and acceptability of the non-available items. Suitability refers to technical considerations such as strength, size, conductivity or any other related things whereas acceptability refers to the use of that item by the PBSs or potential customers. MPSS directorate provides suggestion to system engineering and design (SE&D) directorate for substitute items. Substitute items are used to meet up crisis of required items, some other items may be used as alternative or substitute items, but user must have to take approval from competent authority. For example, B-31 (clamp, wedge) can be substituted by E-17 (#6 service grip).
- o **Redundant** stock is stock that is excess to foreseeable requirements. Redundant stock can arise from over-ordering or because of a failure to react appropriately to a decline in demand for the item.

Warehouse or stores should inform MPSS about the materials that are not used or issued within one year. MPSS will take to take necessary steps for identifying slow and dead items and their use also. Store or warehouse in charge can review the issues of the last twelve month from the monthly activity store report. There are 362 items in the central warehouse, Dhaka that are identified as slow moving or unusable.

6.10 CONCLUSION

REB is a not for profit organization, therefore, any cost reduction or value addition through its functions can directly contribute to the improvement of its customer service. The conventional wisdom is that warehouse functions only add cost and not value but in fact, this is not the case. However, in certain circumstances value can be added to the supply chain in a number of ways through the warehouse functions. Warehouse plays a crucial role as part of the physical link or ‘interface’ between an organization and its customers. This interface is recognized as having important customer service and customer contact roles. Availability and delivery of goods to the ‘right place at the right time in the right quantity’ is vital to customers. The concept of customer service demonstrates a clear example of adding value.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 PROBLEM IDENTIFICATION

Warehouse is a storage facility that receives goods and products for the eventual distribution to consumers or other businesses. Warehouse management is concerned with ensuring that all the activities involved in warehousing are carried out efficiently and effectively by those employed in the warehouse. In other words, it is the process of coordinating the incoming goods, the subsequent storage and tracking of the goods, and finally, the distribution of the goods to their proper destinations. The focus for REB is increasingly on 'Delighting the Customer'. Stockholding policy (or physical storage & distribution) has a crucial role to play in helping to deliver this objective.

The study found that, every year billions are spent (90% of REBs total expenditure) for the procurement of equipment and materials required for construction and maintenance which are then stored in three central warehouses of REB and later distributed to other stores and project sites according to the requirements.

Based on the earlier study, we know, REB has not traditionally seen warehouse function as 'profit centre' rather considered as 'cost centre' and has no specific long term vision and goals. In addition, existing performance of Warehouse Management is not that much satisfactory in terms of efficiency and effectiveness in comparison with the present standards of similar industry.

Therefore, efficient and effective warehouse management has crucial roles to play for the organization. Warehouse Management provides maximum profitability with the minimum investment through ordering cost and carrying of materials. It provides service and controls function of the flow of materials entering and distributed at a company.

7.2 RECOMMENDATIONS

Based on the response of the respondents', observation and literature review problems are identified and conclusions are drawn. The study recommends some possible improvement in the key areas of REB warehouse management such as organization and management, warehouse and warehouse premises management strategy, security, health and safety, use of ICT, disposal of goods, annual procurement plan and training of personnel's. I believe that, if REB considers and implements those recommendations in warehouse management then existing performance of warehouse management at Central Warehouse, Dhaka would

certainly improve which in turn can be implemented throughout REB to improve its overall performance regarding warehouse management.

7.2.1 WAREHOUSE MANAGEMENT STRATEGY

REB warehouses/ stores are operated and managed within a defined policy framework and under the control of the directorate of 'Clearing, Storing and Movement (CS&M)'. The policy instruction 100-33 and 100-46 serves as the outline for the materials and warehouse management functions. These policy instructions were developed at the beginning of REB in 1980s. Often some of these instructions are revised to accommodate changes in warehouse management but as the warehouse concept has changed greatly since 80s REB should consider revising the whole policy instructions related to warehouse management to accommodate modern age warehouse management issues.

Warehouse management of REB requires long-term planning to be fully effective. Planning should include setting objectives, quantifying targets for achievement and communicating these targets to others. This process incorporates selecting strategies, tactics, policies, programs and procedures for achieving the objectives. REB management should determine vision, mission and objectives of store management and initiatives should be taken for short term, medium term and long term plan.

7.2.2 WAREHOUSE PREMISES

The central warehouse, Dhaka is situated inside the boundary of "Workshop cum Warehouse Complex" situated at Savar, Dhaka. This complex has a single entry for various offices and residential buildings such as the Warehouse, System Operation Central Workshop, System Operation Zonal Office, Training Centre of Training Directorate, Superintending Engineer (Dhaka Zone) office, Executive Engineer (Project Division, Dhaka) and residential buildings for REB officers and employees.

This is not a good approach for a warehouse. It can compromise its safety and security and also hamper sound operation and management. Therefore, there should be a separate boundary or at least fencing with manned gate to isolate the warehouse from other offices and residential area within the complex.

7.2.3 WAREHOUSING AND STORAGE

There are three open yard storage facility, one shaded storage facility and one godown (shaded & enclosed by boundary) facility at central warehouse, Dhaka.

Open yards are used to store insulators, conductors, transformers, CT/PT, log, etc. One of the yards has brick soling but rest two did not have any soling. During rainy season, the open yards which doesn't have brick soling becomes muddy and working with crane, fork lift or any kind of handling materials becomes very difficult. It can also pose health and safety hazard for workers.

Therefore, these yards should be developed by making brick soling on the ground as a short term solution. If possible the ground of entire open yard should be developed and C.C. Casting should be made as a long-term solution.

Materials which require protection against sun and rain such as substation switch, meter, grip/ line guard, etc. are stored in the shaded storage facility. There is a scope of utilizing the space more effectively and efficiently.

The single godown (shaded & enclosed by boundary) facility is used for more valuable and sophisticated items such as hardware materials & furniture. This storage facility has an approximate floor space of 8,000 sft and approximate height is 30-40 ft.

Internally the godown is congested with large amounts of floor space being taken up with stock piles. There are also materials stacked in aisles which impede access. However, there are a few racks are available and racking locations are of a fixed height, which means that often pallets of product are left on the floor because there are no storage slots of the right size to accommodate them. The storage system is also fixed, with different parts of the godown allocated to different products which has led to some areas being under-utilized whilst other areas are full.

The internal congestion in the warehouse is leading to delays in the picking and cross docking operation which is leading to delays in loading and unloading vehicles. High value stock items, for example computer accessories, are also stored in the administrative office space, just like other stock, many at ground level.

Ways of resolving this could be with:

- Improve housekeeping can keep the aisles clear;

- Use of mezzanine floors which increase the storage density by utilizing the working height of the store but also allow people to access the products.
- Use of flexible Racking to allow accessibility of the product whilst utilizing the height of the building;
- Use of VNA racking or moveable shelving which increases storage density but still allows accessibility;
- Use of carousels to increase the accessibility of small items but also allow storage in greater density;
- Use of high bay warehouses can also increase storage density;
- Working towards the elimination or reduction in the space required for goods in checking. By working with suppliers to ensure that stock accuracy is improved
- Replacing the racking with adjustable racking which would allow better space utilization. This could also be done in conjunction with the introduction of some new MHE to allow for higher storage density to be achieved. The use of mezzanine floors to make use of the warehouse cube;
- The introduction of a computerized stock control system that allows the use of random locations and more accurate stock checks this would improve the utilization of the storage area as well as providing;
- High value stock items such as computer accessories should be kept in place where access is restricted and lock and key should be used;

7.2.4 SECURITY

The materials and equipments kept at warehouse are of high value in nature; therefore, there is a wide range of potential theft opportunities both internal and external to REB. The main risks could be identified as:

- Risk of theft by employees both in the warehouse and drivers.
- Risk of break in to the warehouse by external people.
- Theft from the tailboard of delivery vehicles.
- Risk of vehicle hijack.

The threat from internal sources is more likely as people have greater opportunity to steal items when they are in daily contact with them. However the external threat may have more serious consequences both in terms of stock loss and possible injury to staff and so the insurance company would be particularly interested in these security threats.

At REB there are no strong proactive security measures and prevention policy has not been developed yet regarding security issues. Crimes against vehicles and property continue to grow so distribution and warehousing staff must be fully aware of the security risk of their products, transport and support equipment in order to take steps to guard against breaches of security.

A range of steps could be taken to improve the security of the central warehouse, Dhaka may include the following:

Warehouse: External threats could be minimized through

- High, strong and intact fencing with lockable gates.
- Installation of external CCTV cameras after analyzing its requirement.
- Precautions must be taken such as security barriers to prevent unauthorized persons from entering storage areas.
- One entry and exit point from the depot.
- All visitors to be collected from security and accompanied at all times.
- Alarm systems.
- Toilets and rest areas should be positioned so as to ensure that drivers do not enter into inventory.

Internal threats to the warehouse could be minimized through

- Background checks on staff before appointment e.g. verification of references, employment records and history of personnel should be minutely maintained.
- Small high value items in separate lockable areas.
- Frequent searches of staff when exiting depot.
- Internal CCTV cameras.

Transport: External threats to the transport could be minimized through

- Driver training to ensure that they are aware of security threats for example safe parking and not discussing routes.
- Use of tracking devices.
- Provision of vehicle security systems for example immobilizer and steering locks.
- Theft from tailboard.
- Either the provision of a drivers mate for security of a procedure that requires the customers to provide someone to watch the tailboard during unloading.

Internal threats to the transport could be minimized through

- Background checks on staff before appointment e.g. references
- Use of tracking devices and security seals

7.2.5 HEALTH AND SAFETY

The warehouse environment necessitates a variety of operations such as the manual handling of goods; forklift trucks loading and unloading, reversing and maneuverings; stock checks; and ‘picking and packing’ to name a few. Too often the operator or individual involved is concentrating on their own role and ignoring what is going on around them.

Manual handling accounts for about 25 per cent of reported injuries in industry and correct procedures need to be put in place to reduce the likelihood of this type of injury occurring (Storage and Distribution, 2010). Other hazards such as collisions, vehicle overturns, poor handling of goods, collapses and equipment malfunctions must all be considered, particularly when working in a time-pressured customer service environment.

REB has a clearly defined policy for safety measures in warehouse environment, fire precautions and handling materials. Each officer/ supervisor is responsible for their own safety and also for the safe work performance of other employees under their supervision, safety of the fellow employees and safety of the general public.

Surprisingly, in the Dhaka Central Warehouse of REB the health and safety issues are neglected. It seems that store management is not concerned to ensure the use of personal protective equipments like helmets, gloves, mask or face protectors, eye protectors, high visibility clothing, and safety footwear, safety harnesses as and when required during working at stores. The numbers of fire fighting equipments such as fire extinguishers are insufficient. Store Staffs are not properly trained and informed of safety issues at work. Even the importance of Safety Register is ignored.

Safety within the warehouse is an integral part of its operation. It should be recognized as a top priority. To improve the present condition of health and safety, first of all REB management need to ensure implementation of the policy for safety measures in warehouse environment, fire precautions and handling materials.

Personnel working at warehouse should be given specific training to make them conversant to store environment, understand the hazards associated with their work and the procedures to perform the work safely.

Employees should be motivated to follow the guidelines and there should be provision for punishment in case of any negligence. Safety is everybody's responsibility, not just managers, supervisors or operators; each individual is legally bound to take responsibility for not only their own safety but also the safety of others around them.

7.2.6 USE OF INFORMATION AND COMMUNICATION TECHNOLOGY

Until now, REB store management has limited access to modern ICT blessings to operate more efficiently and effectively. Even there is no official internet connection at central warehouse, Dhaka; employees use their own internet connection for sending emails and exchange information. Before receiving and issuing of materials at CWD, store personnel manually fills the receive or issue Tally Sheet, no tally software is used. In addition, some of the staffs are not efficient in using computer and tally software which is indeed a major concern for store management.

The use of ICT in REB warehouses is very limited compared to modern warehouses. Currently REB uses a common inventory management system in all central warehouses (CPWs), field project warehouses (FPWs) and PBS warehouses (PBSWs) developed and maintained by Automation Engineering but they are not interconnected. The inventory management system of each FPWs and PBSWs are updated by store keepers or assistant store keepers through manually inputting data when preparing receiving reports or store tickets using the system. Every day at closing hours a storekeeper generates a summarized report from the system and emails to MPSS directorate. Using this uniform report MPSS directorate updates the central database. Therefore, this inventory management system does not update stock records in real time so it does not provide any real time stock information to its users and the stock data is always out of date. In addition, the warehouse computer system is old and only supports a fixed location system.

Storage and distribution personnel have greater demands placed on them than ever because of their role in supply chains and their interface with the customer. To operate effectively the warehouse requires a fast, flexible and accurate IT system with the ability not only to control

operations and reporting within the warehouse, but also to provide required information to any number of end users.

ICT provides a valuable logistic tool and has applications in key areas such as automatic stock control (order point), modeling of proposed changes to warehouse and operational process and vehicle tracking via telematics. If used well, storage and distribution function can benefit from the application of ICT to business problems and issues. ICT has a vital role within storage & distribution function and that without it the supply chain could not operate as efficiently and effectively as it does in some environments today. Therefore, the use of ICT systems could contribute to improved supply chain efficiencies at REB.

The most common features of ICT with respect to storage, distribution and logistics that REB could utilize are:

1 COMMUNICATION

ICT has enabled faster communication and information sharing among people and among organizations. Effective, reliable, and timely communication is vital in storage and distribution function in order to both satisfy customers and reduce inventory holding costs. Basic Communication methods are satellite communication, mobile data, EDI, barcodes, RFID, order processing, etc.

REB could introduce Electronic Data Interchange (EDI) to enable highly accurate information to be communicated across the organization in real time. It is very efficient because it does not require staff to collate the information manually. The use of order processing technologies can enable the provision of better information about both customer orders and visibility of stock availability.

2 PLANNING

Enterprise wide information system or Enterprise Resource Planning (ERP) could be introduced for supply chain planning of REB. ERP encompasses materials planning, profitability, supply chain management, human resources and customer satisfaction – every aspect of business. It is a transaction based information systems that are integrated across the whole business.

3 WAREHOUSING

The introduction of warehouse management systems (WMS) could enable all the activities of the REB warehouse to be controlled and better synchronized which will lead to the reduction in wasted time and effort and can also enable the use of different types of storage and handling systems. This can facilitate complete automation of the existing warehouse in the near future.

The use of random storage systems needs a good information system to enable the warehouse operators to keep track of the location of the stock. The use of Automated Guide Vehicles (AGV's), automated high bay warehouses, automated sortation systems and other automated storage and picking systems are examples of the use of ICT in warehouse situations.

4 INVENTORY

REB could improve its forecasting and inventory management system through the use of ICT. ICT allows for both the better forecasting of inventory requirements as well as the ability to run the day to day detailed management of stock control within the organization. This allows organizations to reduce the amount of hours taken to control stock as well as enabling organizations to optimize their stockholding and increase customer service levels. This has also enabled organizations to keep a more accurate record of stock, which has enabled issues such as theft and damage to be both identified and controlled.

5 MONITORING AND ASSET VISIBILITY

The development of technology in the field of radio frequency identification (RFID), real time location systems (RTLS), smart active labels (SAL) and telemetric have enabled monitoring and tracking of materials and equipments within a warehouse environment or during its transportation from one point to another in the supply chain. These inexpensive tagging devices and tamper alerting seals can provide precise location details as well as additional security against theft. Use of these ICTs will definitely increase the visibility, traceability and security of materials and equipments.

In replenishment-based systems, whenever the total inventory at a warehouse drops below a certain level, ICT for example a RFID enabled system could place an automatic order.

Tagging of materials and equipments can enable warehouses to automatically track the location and count of inventories in real time; better monitor demand for certain products and place orders to prevent an out-of-stock situation; faster stock checks in warehouses; record stock movements; maintain stock balance; monitor utilization; sort order requirements; recording and identifying damage; and track the movement of goods through the system.

Other modern ICTs used in warehouse and distribution environment may include computerized routing and scheduling, international trade management systems, supply chain event management system, EPOS, etc.

REB needs to ensure, all store related staffs should get access to internet. IT system should be integrated in such a way that it could utilize the above mentioned features and functions of ICT.

7.2.7 DISPOSAL OF GOODS

There are 352 items in the central warehouse, Dhaka that are identified as slow moving or unusable. These goods should be handled in accordance with a procedure which involves at least the physical segregation of such goods in a dedicated area in order to avoid confusion and prevent distribution until a decision has been taken by top management of REB with regard to their disposition. Goods should be destroyed where necessary in accordance with international, national and local requirements regarding disposal of such goods, and with due consideration to protection of the environment.

7.2.8 ANNUAL PROCUREMENT PLAN

The digital ledger of the central warehouse, Dhaka shows 272 different items are stocked in this facility. In order to minimize excess holding stock, it is recommended to implement a précised Annual Procurement Policy at REB for all types of procurement beforehand of the financial year begins. The Annual Procurement Policy should be in accordance with best practice as outlined in Public Procurement Act-2006 and Public Procurement Regulation-2008.

7.2.9 TRAINING

The lack of basic skills training is undoubtedly partially responsible for some of operational accuracy issues. A training needs analysis of store related staffs should be undertaken. After

that all personnel involved in store management (both internal and external staffs) should be trained. Records of all trainings should be kept not only in Human Resource Management but also in Store. For example, as some of the staffs are not efficient in using computer they should be given necessary training.

7.3 CONCLUSION

In today's world warehouse management is considered as an indivisible part of all business. If effectively and efficiently organized and managed the REB warehouses could deliver safe custody of materials, clear monitoring and accountability, distribution of the right goods at the right time whenever required in the right condition to all user departments, maximum profitability with the minimum investment through ordering cost and carrying of materials. It provides service and controls function of the flow of materials entering and distributed at a company. In general, this study is expected to be helpful for the policy makers of REB to improve the existing performance of warehouse management at Central Warehouse, Dhaka which in turn can be implemented throughout REB to improve its overall performance.

REFERENCES

Alan, R., Phil, C. and Peter, B. (2010). *The Hand Book of Logistics & Distribution Management (4th Edition)*: Kogan Page Ltd. UK.

Aminoff, A. & Kettunen, O. & Pajunen-Muhonen, H. 2002. *Research on Factors Affecting Warehousing Efficiency*. International Journal of Logistics. Vol. 5, No. 1. p. 45-57.

Annual Report 2008-09, REB

B.D. Rahmatullah, Nancy Norris and John Richards (2008). "A New Mandate for the Rural Electrification Board Area-Based Planning Initiatives to Relieve Power Shortages". Centre for Policy Research (CPR Commentary Number 6), IUBAT.

Baker, Peter., 2007; *An exploratory framework of the role of inventory and warehousing in international supply chains*, Emerald Group Publishing Limited.

Baker, P. & Canessa, M., 2009. *Warehouse design: A structured approach*. European Journal of Operational Research. Vol. 193, No. 2. p. 425-436.

Baker, P. 2004. Aligning Distribution Centre Operations to Supply Chain Strategy. International Journal of Logistics Management. Vol. 15, No. 1. p. 111-123.

Ballard, R.L., 1996; Methods of inventory monitoring and measurement, Logistics Information Management, Volume 9, Issue 3.

Chua, B., and Teo, K.B. (2008). *The Practitioner's Definitive Guide*. Straits Time Press, Singapore.

Cooper, J.C, Davis. Matthew (1984). *Why have a warehouse?* MCB UP Ltd, Volume 12, Issue 5, Page 66 – 68.

Croxton, K.L. 2003. The order fulfillment process. The International Journal of Logistics Management. Vol. 14, No. 1. p. 19-32.

Dymond, Mike MILT., 2007; Warehouse Labour Management comes of age, The Chartered Institute of Logistics and Transport (UK), FEB.

Encyclopedia of Business 2nd ed., Reference for Business, Retrieved on 01 August 2012 from <http://www.referenceforbusiness.com/management/Tr-Z/Warehousing-and-Warehouse-Management.html>.

Faber, N. & de Koster, R.B.M., van de Velde, S. (2002). *Linking warehouse complexity to warehouse planning and control structure*. International Journal of Physical Distribution & Logistics Management. Vol. 32, No. 5. p. 381-395.

Frazelle, E.H. (2002). *World-class warehousing and material handling*. McGraw-Hill, New York.

Frazelle, E.H. (2002). *Supply Chain Strategy*. McGraw-Hill, New York.

Gu, J. & Goetschalckx, M. & McGinnis, L. 2007. Research on warehouse operation: A comprehensive review. *European Journal of Operational Research*. Vol. 177, No. 1. p. 1-21.

Gunasekaran, H.B. Marri, F. Menci., 1999 Improving the effectiveness of warehousing operations: a case study, *Industrial Management & Data Systems*, MCB UP Ltd, Volume , 99, Issue 8, Page 328- 339.

Higginson, J. K. & Bookbinder, J. H. 2005. *Logistics Systems: Design and Optimisation*. Springer, New York.

Hompel, Michael Ten., Schmidt, Thorsten., 2007; *Warehouse management: Automation and organisation of warehouse and order picking systems*, Springer-Verlag Berlin Heidelberg.

Jones, D.T., Hines, P. & Rich, N. 1997. Lean logistics. *International Journal of Physical Distribution & Logistics Management*. Vol. 27, No. 3/4. p. 153-173.

Johansson, P. & Olhager, J. 2004. Industrial service profiling: Matching service offerings and processes. *International Journal of Production Economics*. Vol. 89, No. 3. p. 309-320.

Krajewski, L. J. & Ritzman, L. P. (2005). *Operations management: processes and value chains, 7th International Edition*. Pearson Prentice Hall, Upper Saddle River (NJ).

Management Innovations (2008, December), Define Management & Its Functions. Retrieved from <http://managementinnovations.wordpress.com/2008/12/03/define-management-its-functions/> on 17 November 2012.

Management Study Guide. Functions of Management. Retrieved on 10 October 2012 from http://www.managementstudyguide.com/management_functions.htm

Management in the Purchasing Function – The official CIPS Course Book (2010, October), Stamford, Lincolnshire, UK: Profex Publishing Limited.

Mentzer, T. & John, A. (2001). *Supply Chain Management (2nd Edition)*: Publicerad av SAGE.

Phillips, Ed. 2010. Warehouse Layout & Design. Retrieved on May 27, 2012, from <http://www.strategosinc.com/warehouse.htm>

Power, D. J., Gannon, M., McGinnis, M. and Schweiger, D. (1986). *Strategic Management Skills*. MA: Addison-Wesley, ISBN: 0201139782.

Rahmatullah, B.D. 2005. Case Study on Performance Target Agreements (PTA). PowerPoint presentation available from author.

REB website: www.reb.gov.bd/

Rouwenhorst, B., Reuter, B., Stockrahm, V., van Houtum, G.J., Mantel, R.J. & Zijm, W.H.M. 2000. Warehouse design and control: Framework and literature review. *European Journal of Operational Research*. Vol. 122, No. 3. p. 515-533.

Steven P. Robbins and Mary Coulter (2005). *Management* (8th edition). New Jersey, USA: Prentice Hall Inc.

Storage and Distribution (2010). *The Official CIPS Course Book*, 2011, Profex Publishing Limited.

Strategic Supply Chain Management – The official CIPS Course Book (2010, October), Stamford, Lincolnshire, UK: Profex Publishing Limited.

Study Mode (2011, April), Definition of Management and Managerial Roles. Retrieved on October 08, 2011, from <http://www.studymode.com/essays/Definition-Of-Management-And-Managerial-Roles-673984.html>

Tompkins, A. James., Smith, D. Jerry D. (1998). *The Warehouse Management Handbook*: Tompkins press.

Tompkins, James A. and White, John A. (1984) *Facilities Planning*: John Wiley and Sons, New York.

Tompkins et al. (1996) *Facilities Planning*, 2nd. ed.: John Wiley and Sons, New York.

Van den Berg, J.P. & Zijm, W.H.M. 1999. Models for warehouse management: Classification and examples. *International Journal of Production Economics*. Vol. 59, No.s 1-3, p. 519-528.

Wikipedia, www.wikipedia.org

Wikipedia (last modified on 14 November 2012). Henri Fayol. Retrieved on 17 November 2012 from http://en.wikipedia.org/wiki/Henri_Fayol

Warehouse Management for Engineers (2001), Training Manual, Training Directorate, REB & NRECA International Ltd.

Yao, A.C. & Carlson, J.G. 1999. The impact of real-time data communication on inventory management. *International Journal of Production Economics*. Vol. 59, No.s 1-3. p. 213-219.

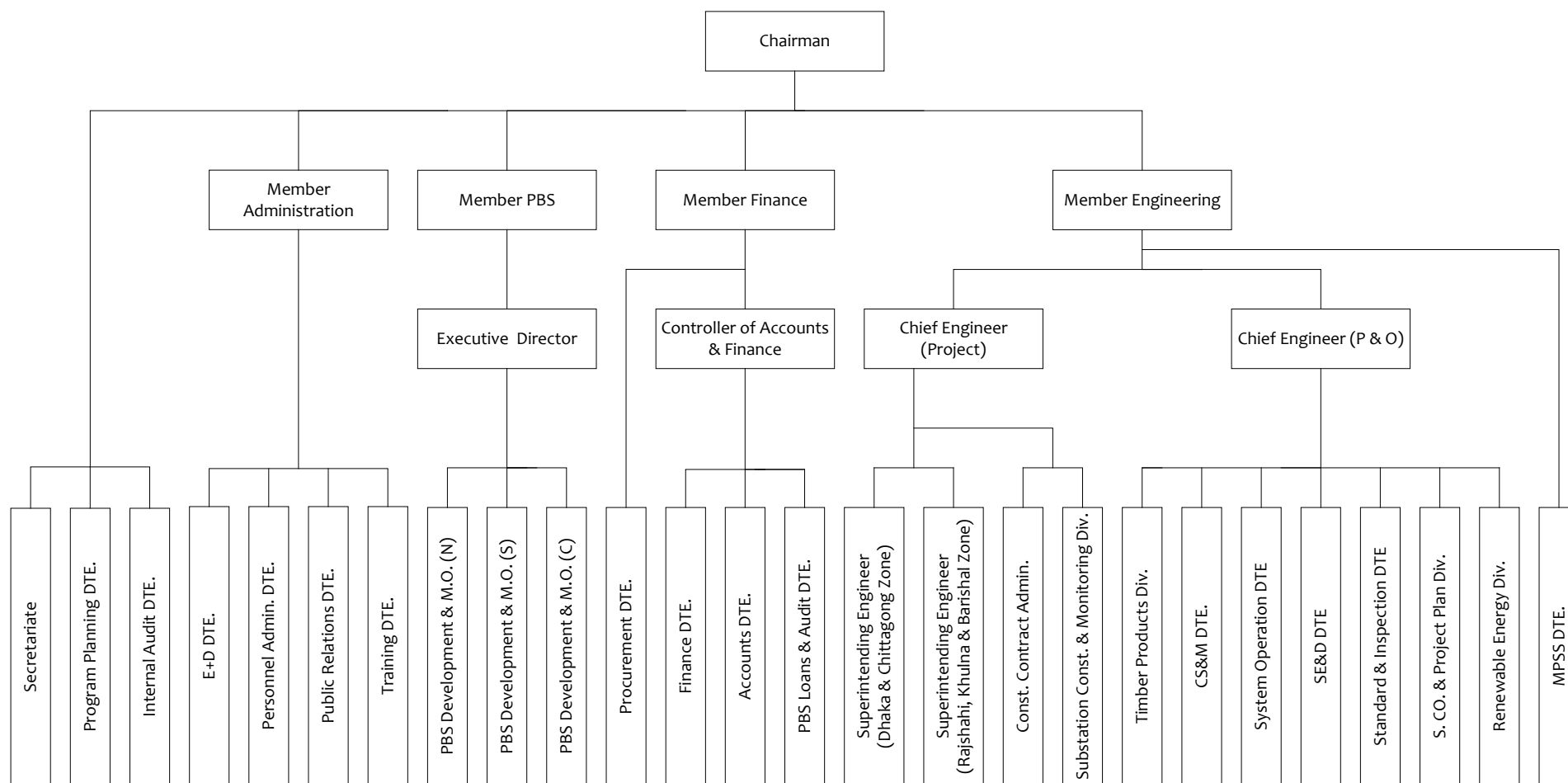
Appendix

Rural Electrification Program at a Glance (as on October' 2012)

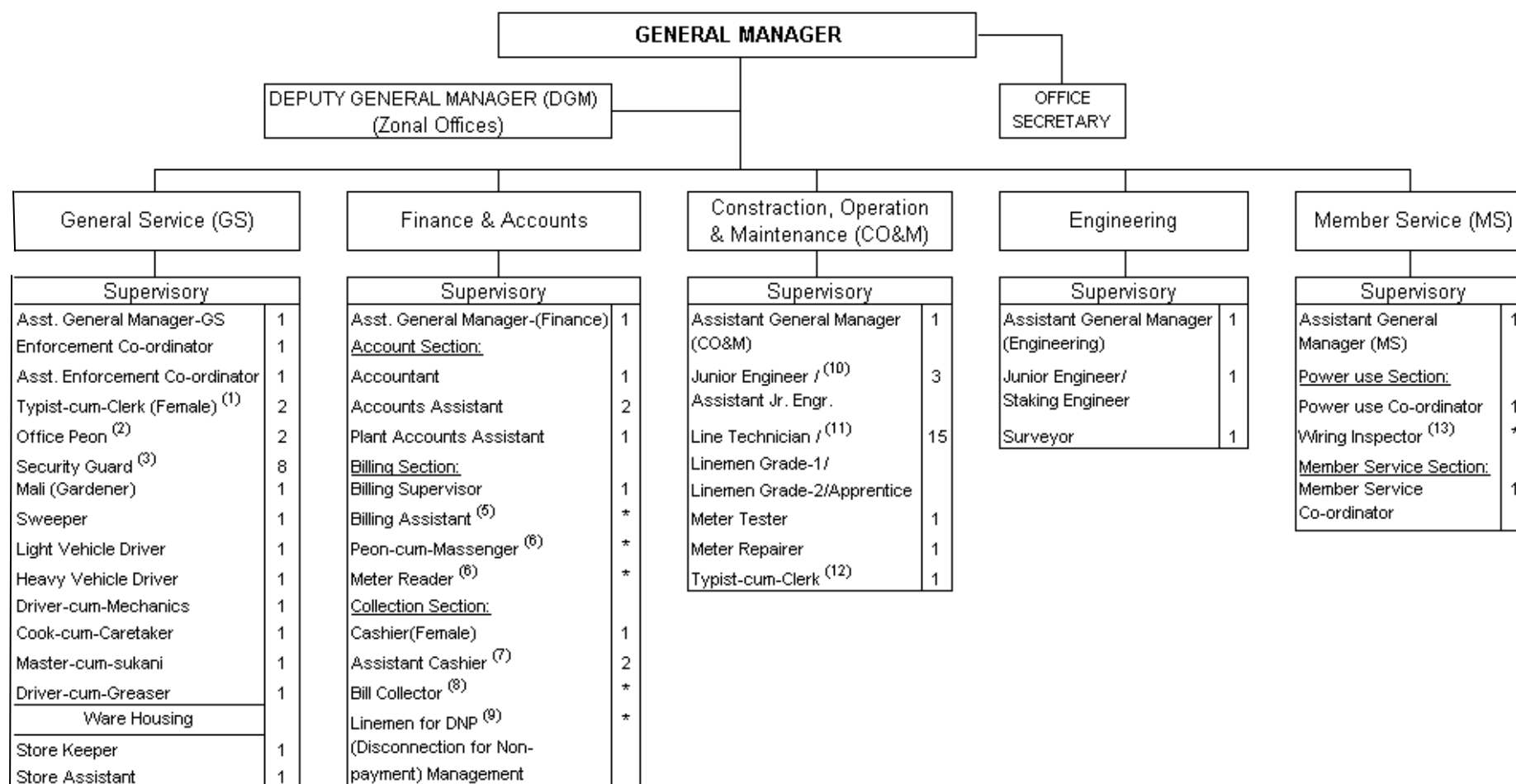
* Number of PBSs organized	70
* Number of PBSs operating commercially	70
* Number of District under the program	61
* Number of Up-Zillas under the program	453
* Number of villages electrified	49,279
* Total 33/11 KV sub-stations constructed and commissioned (June'2012)	439
* Installed Capacity of Sub-stations (June'2012)	4295 MVA
* Total number of irrigation pumps connected	1,68,442
* Total number of solar powered irrigation pumps	40
* Number of villages energized (May'12)	50,614
* Distribution Line constructed (Km)	2,37,564 Km
* Total distribution line energized	2,32,006 Km
* Total number of consumers	91,94,240
* Category wise connection (May 12)	
Domestic	84.48%
Commercial	9.34%
Irrigation	2.72%
Char Inst.	1.62%
GP	1.53%
St. Light	0.16%
Solar	0.15%
LP	0.01%
* Number of population in Program Area (May'12)	9,88,16,559
* System loss	12.80%

(Source: REB Website)

REB Organogram



PBS Organogram



Manpower Strength

Organization/ Employer	Number of Employees		
	Officer	Staff	Total
REB (Revenue)	579	639	1,218
REB (Projects)	347	451	798
PBS	860	29,140	30,000
Grand Total			32,016

Shortage of Manpower

Type	Auth Post	Held	Vacant
Class-1	420	349	71 (17%)
Class-2	159	103	56 (35%)
Class-3	485	358	127 (26%)
Class-4	154	112	42 (27%)
Total	1,218	922	296 (24%)

KPI Targets and Weight Factors (FY 2012-13)

S/L	Parameters	Units	Target 2012-13	Weight Factors
1	System Loss	%	13.35	35
2	Accts Receivable	Months	1.48	15
3	Coll/Bill Ratio (%)	%	98.50	5
4	Coll/Imp Ratio %	%	85.35	15
5	Current Ratio	Ratio	2:1	Obsn
6	Quick Ratio	Ratio	1:1	Obsn
7	DSC Ratio	Ratio	1.1	Obsn
8	Power Factor (Min)	%	90	5
9.	SAIDI (Sys Avg Interr Dur Indx)	Minutes/Year/ Consumer	3500	5
10.	SAIFI (Sys Avg Interr Freq Indx)	Numbers/ Year /Cons	300	5
11.	Training/Employee	Hours/ Employee/Year	60	5
12.	Annual Dev. Program (Phy)	%	100	5
13.	Annual Dev. Program (Fin)	%	100	5

List of Persons Interviewed

SL	Name & Designation	Office & Address
01.	Md. Zafar Sadeque Executive engineer	Renewable Energy Division REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
02.	Md. Faruk Hossain Assistant Store Keeper	MPSS Directorate, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
03.	Dilruba Siraji Assistant Director	CS&M Directorate, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
04.	Md. Abul Hossain Deputy Director	Central Warehouse, REB, Savar, Dhaka.
05.	Md. Nasir Uddin Shikdar Assistant Store Keeper	Central Warehouse, REB, Savar, Dhaka.
06.	Mohd. Mohibur Rahman Assistant Engineer	MPSS Directorate, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
07.	S. M. Anamul Haque Deputy Director	MPSS Directorate, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
08.	Md. Rabiul Islam Assistant Engineer	General Administration Division, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
09.	Md. Abul Kalam Azad Project Director	MPSS Directorate, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
10.	Ashok Kumar Ghosh Assistant Engineer	Program planning, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
11.	Biswajit Roy Assistant Engineer	Program planning, REB, REB H/Q, Nikunja-2, Khilkhet, Dhaka – 1229.
12.	Md. Samsul Haque Managing Director	Automation Engineering 6/10, Humayun Road, Mohammadpur, Dhaka.
13.	Md. Yousuf Assembling Supervisor	Pasha Electric Int. South Avenue Tower, House#50 (2 nd Floor), Block-B, Road#3, Gulshan Avenue, Gulshan 1, Dhaka.
14.	Azizul Haque Sr. Manager	Techno Venture Ltd.
15.	Saiduzzaman	SQ Trading

Central Warehouse, Dhaka in Pictures



Picture 1 Open yard storage facility of Central Warehouse, Dhaka



Picture 2 Shaded storage facility of Central Warehouse, Dhaka



Picture 3 Godown storage facility of Central Warehouse, Dhaka



Picture 4 Proposed godown storage facility of Central Warehouse, Dhaka



Picture 5 Store Keeper's Office at Central Warehouse, Dhaka



Picture 6 Forklift Truck used at Central Warehouse, Dhaka