PREFACE

Indian Railway (IR) is in the businesses of providing transport service. It is world's largest passenger network carrying 22.5 million passengers per day and third largest freight network carrying 3 million tonnes per day. For providing these services the Indian railway is currently maintaining assets consisting of 90000 track kilometres, 6000 diesel locomotives, 5000 electric locomotives, 2.5 lakhs wagons and 66000 coaches and other passenger carrying vehicles. IR assets base is increasing so as to meet the growth in demand. IR is divided into 17 zonal railways and 6 production units. A zonal railways core activity is to provide transport service whereas production units supply the part requirement of rolling stock.

The material management department of the Indian railway deals with the total system approach for meeting the requirement of raw materials and components required for maintenance of assets at Zonal railways and production of rolling stock at production units. It deals all the aspects of material management function which include coordination of planning, budgeting, forecasting the requirement, sourcing, procurement ware housing, distribution, waste management and all related functions. These activities cover's all the key components of inbound supply chain management.

Indian railway material management department is required to procure and carry out all material management related functions, for total procurement value of Rs. 42000 crores per annum. It has 262 warehouses over the Indian railway network for uninterrupted supplier of railway material and stores. Over one lakh material components of various descriptions are a stock in these depots. Material management department is required to carry out the supply chain management function under strict rules of public procurement. The supply chain management require the integration of all related activities seamlessly but in the public procurement environment all the activities performed as an individual transaction. Some of the issues in public procurement are cost management, long lead time of procurement, high out of stock situation, high level of inventory and supplier relation management. The aim of this research is to recommend structural changes in the procurement and converting it as a driver of entire supply chain. It also provides a model of vendor evaluation and relation management on real-time basis.

Objectives of the Research

1. Flagging of all the issues related with procurement and supply chain management of railway material.
2. Suggesting model of vendor managed inventory so as to take care of issues related with budget management, situation of stock out and high inventory.
3. Portfolio analysis of raw material and bought out component for identifying areas of strength and vulnerability. Formulating the model of vendor evaluation and relation management and its integration with supply chain.
4. Suggesting structural changes so as to make procurement as Supply Chain Management (SCM).

First part of the work deals with evolution of material management function in a industry in general and railways in particular. The railway is required to manage its supply chain in public procurement environment. The best practices of managing the effective supply chain are studied. The issues which are coming in the way of effective supply chain management of Indian Railways are flagged. These best practices are customized to suit the public procurement environment.

Second part is focused on the problem of cost management budget management and situations of stock outs and high inventory. These problems are the result of Bullwhip effect, asymmetry of information, and high lead time of procurement. The various activities of supply chain are performed in compliance with strict rules, codes and manuals which are written and developed over a long period of time. It is seen that the material management function is supported by an Enterprise Relationship Planning (ERP) called Material Management Information System (MMIS). All the activities of material management from forecasting of requirement, generation of demand, calling of bids, award of contract, receipt issue and budget management are mapped and carried out on Material Management Information System (MMIS). While implementing this MMIS the existing procedure is replicated on Material Management Information System (MMIS). Implementations of Information Technology (IT) without changing the business process will only realize some of the possible benefits. Mere Information Technology (IT) or internet does not solve the problem. In this part business process is re-engineering to achieve integration of various linked activities and a model of strategic utilization of information is suggested.

In this part a model of vendor managed inventory which is customized to suit the public procurement environment is recommended. This model is expected to take care of most of the malaise of Bullwhip effect such as high inventory, high stock out situation and budget management.

The third and last part of the work is related with supplier evaluation and relation management. It deals with portfolio analysis of bought out items as per Kraljic Model to identify strategic, leverage and bottleneck items. A model has been suggested to evaluate the supplier under four salient criteria such as-on time delivery, quality, price and service. The suppliers are classified into three categories depending upon their scores on these parameters. The model has been suggested to link the supplier performance with their share of business in a transparent manner on real time basis. This method of supplier relation management is customize to suit the public procurement environment and expected to be very effective in tackling the problem of cartel formation and poor performance of the supplier. The model shall incentivize the supplier to improve and maintain the performance on all the key performance parameters. This model makes procurement as driver of Supply Chain Management.

The expected benefit of this research is reduction in the cost of procurement by 7 to 8% p.a. by long term contracts, amortizing the fixed cost over a long duration, taking care of cartel formation and incentivizing the supplier to maintain high performance on all the key performance parameters. This will also ensure reduction in potential loss due to supply disruptions which means the availability and reliability of rolling stock shall improve for carrying transport. The inventory level and thus inventory carrying cost shall reduce by switching over to vendor managed inventory. This model will incentivise the supplier for value engineering and innovation. All these benefits leads to 5^{th} level of maturity of supply chain i.e. Extended Supply Chain for Global Optimization.