CHAPTER THREE

RESEARCH METHODOLOGY

This chapter discusses research methodology followed to address the set research questions. First it enumerates the case study approach which is followed by the flow of the study, the research process, research design, data sources and respondent profiles.

3.1 Introduction

Public procurement expenditure in India is estimated to be more than Rs.15 lakh Crore per year and is handled by pool of talented personnel. It faces challenges such as failure to buy right quality, in right quantity, at right time and at the right price, lack of transparency and corruption. Supply chain is end-to-end integration of key business process starting from the end users up to the original suppliers that create value for various customers (Felix and Chan, 2003).Supply Chain Management (SCM) underscores proactive relationships and integration across all partner of supply chain. Theoretical development of supply chain is dominantly influenced from the insights of private organisations. Most of the successful supply chain stories are derived from case studies of private organizations.

This case is the study of the public procurement system of the Indian Railway. The research is carried out in four parts. One is study of environment of public procurement, cycle time etc., second is the inventory management inadequacies and associated solutions, third is the evaluation of supplier and Supplier Relationship Management (SRM) and fourth is to suggesting a model so as to make procurement as driver of supply chain.

3.2 Case Study Approach

The case study approach is an inquiry of a real life phenomenon having blurred boundaries (Yin, 1994) involving cycles of description, explanation and testing (Meredith, 1998). This method is also used to serve the purpose of exploring, describing and explaining empirical setting (Yin, 1994). Qualitative case study is defined as an empirical real-world setting to investigate a focused phenomenon (Barratt and Li, 2011). This aids in building and extending various theories and exploring better understanding of emerging, contemporary phenomenon or issues in their real world settings (Meredith, 1998). This study primarily used elaboration approach of case research (Ketokivi, 2014).

3.2.1 Analysis of Organizational Climate Supplier Relationship

A questionnaire based survey has been performed to measure service quality. Respondents of the survey belonged to Senior Managers of the Indian Railway. A multiple regression based relationship between constituent independent variables of service quality perception and dependent variable expectation has been assessed. The outcome was than validated through available real time secondary data in the form of Supplier Relation Management (SRM). For the purpose of analysis the elements of organizational climate have been put in conjunction with insights derived from successful organizations having good supplier relations management.

3.2.2 Knowledge Transfer Perspective for Supplier Relation Management

A framework has been developed for assessing role of knowledge transfer in the process of Supplier Relationship Management (SRM). In the context of the Indian Railway under study, relationship among actors such executives, customers, industries and society guides the transfer of knowledge. The interaction among these set of actors carve policy implications and presents market opportunities. In this study various semi-structured interviews have been performed with the participants. These interviews have been performed during the workshops held at the National Academy of Indian Railway, Baroda, Vadodara in the year 2015.

3.2.3Study of Requirement Based Supplier Relation Management

Positive organizational climate alone cannot ensure successful and sustainable Supplier Relation Management in rules of law driven organization like the one under study and other inputs are also required. This challenge was addressed through additional study of the approach defined in various customer driven organizations. Towards these organizations with best-in-class supply chains as in automobile industries such as General Motors (GM), Maruti Suzuki India Limited, Tata Motors, ABB, Volvo have been studied.

3.2.4 Study of Supplier

The relationship of the Indian Railway with its suppliers in the form of industries and the development partners were analyzed through purchasing records representing various combinations of user requirement and suppliers. A strategic purchasing model comprised of buyer’s orientation and supplier’s orientation was also analyzed for SCM.

3.3 Research Methodology

In the present research, the unit of analysis is the procurement function of the Indian Railway. Unit of analysis helps in defining boundaries of a theory which in turn sets the limitations in applying the theory (Markus, 1989). Extensive review of literature has been undertaken to develop a holistic view on the supply chain management, service quality and tools for measuring Key Performance Indicator (KPI) for procurement function in upstream SCM of the Indian Railways, budget driven SCM, open and strategic purchasing for SCM. Review of literature has been performed on the basis of various key words as applicable in the context of current research. Various key aspects of literature was classified and reviewed. This review of literature has helped in identification of research gaps, formulation of research questions and associated investigative questions. This investigative process would result into set of outcomes. Operationalization of this methodological approach as shown in Figure 3.1

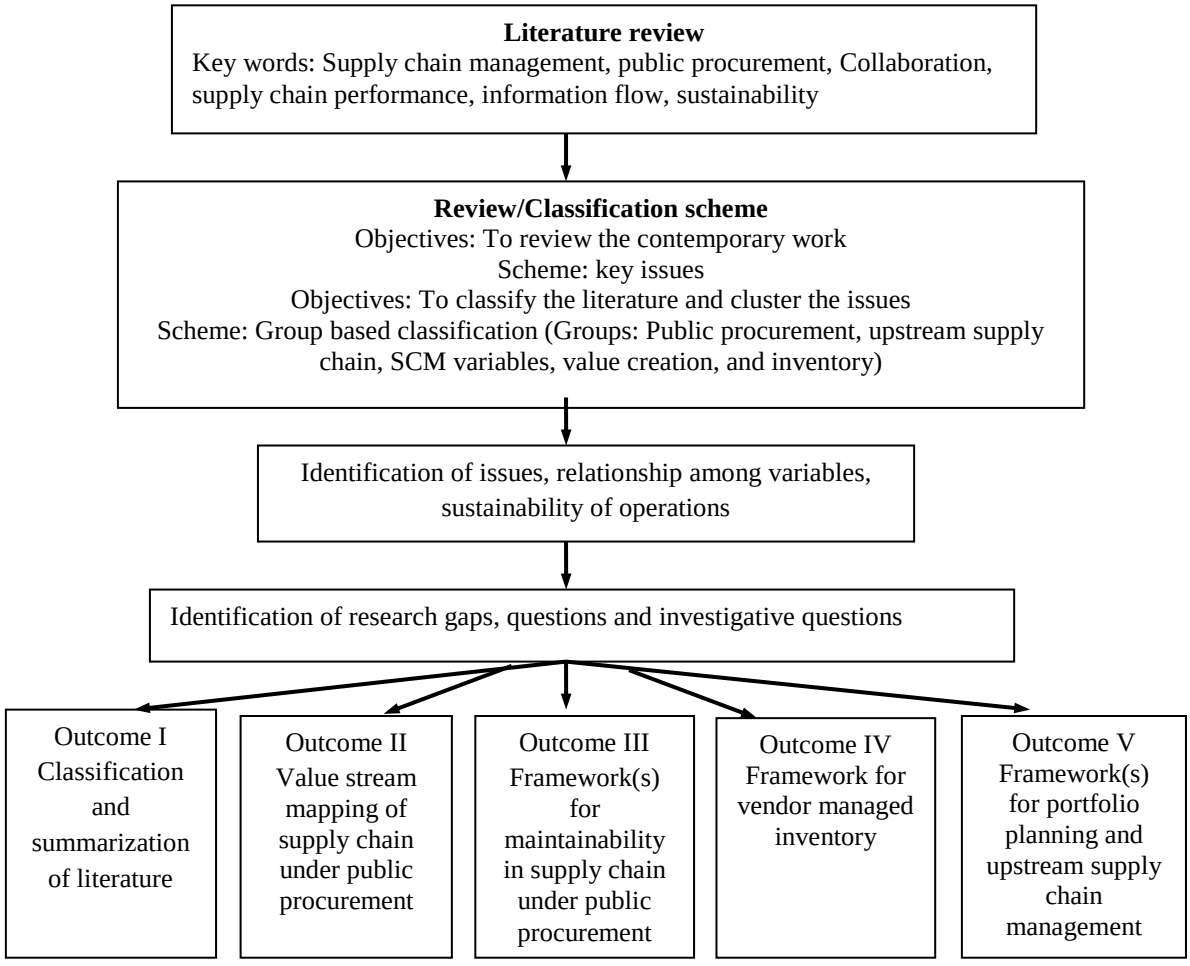

Figure 3.1: Flow of the Study

Source: Conceptualized by researcher

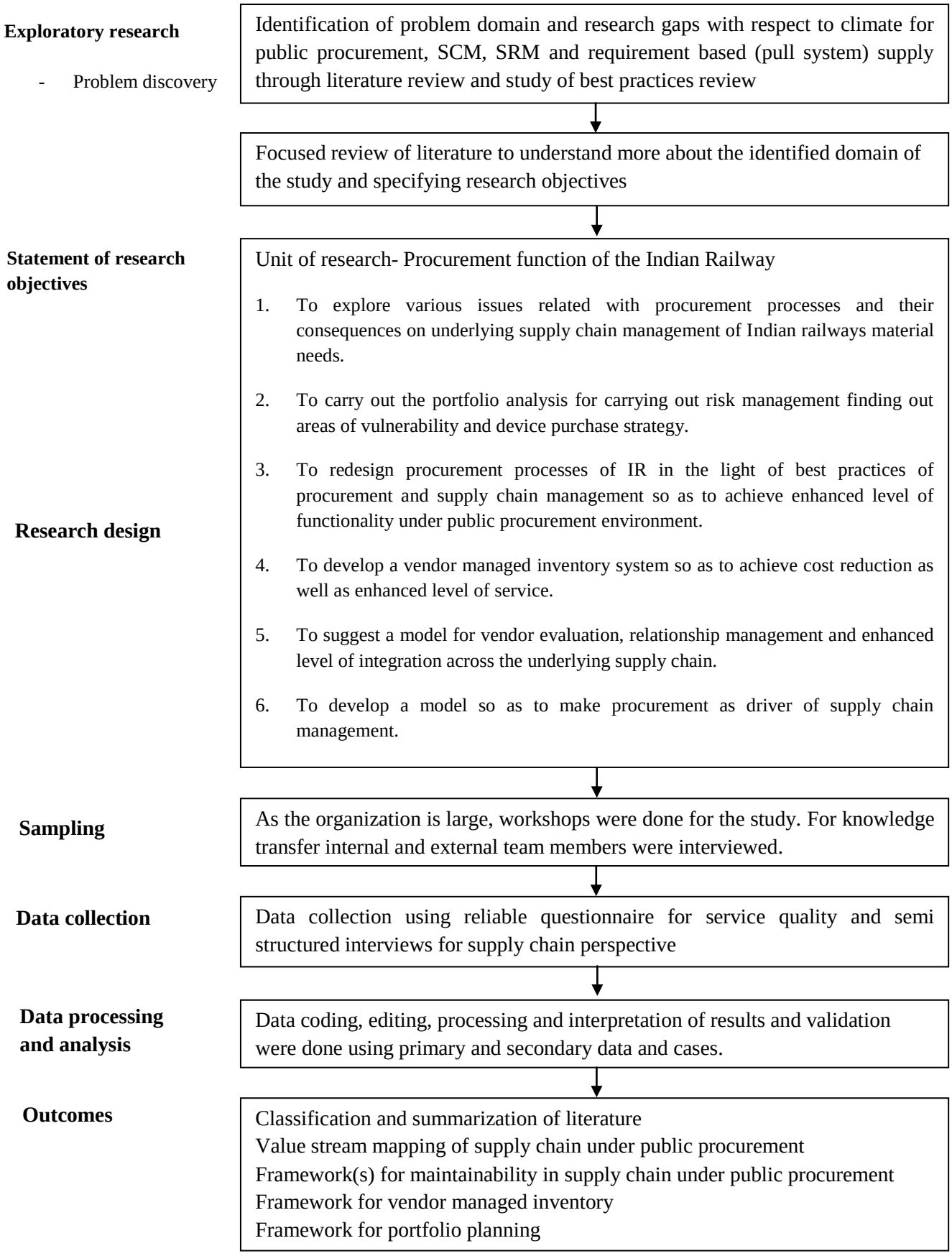

Figure 3.2: Research Process of the Study

Source: Conceptualized by researcher

In the present research, data concerning various aspects of supply chain, service quality and perspectives like budget, requirement driven supply systems, open contract and strategic purchasing in the context of the Indian Railways has been collected for the purpose of research and analysis. Procurement function of the Indian Railways is selected as unit of analysis. The organization structure of all 17 Zonal Railways and six Production Units is almost similar across India. To some extent learning derived from the few zones of the Indian Railways would be useful for other zones of the organization. Various steps of the present research process are depicted in Figure 3.2

3.4 Research Objectives

Preliminary review of literature helped in identifying research gaps. A focused review of literature has been undertaken to understand more about the identified domain of the study and conceptualization of research questions. Keeping in view all the above, the following objectives were kept for the study.

Objectives of the Study

1. To explore various issues related with procurement processes and their consequences on underlying Supply Chain Management (SCM) of Indian Railways material needs.
2. To develop a Vendor Managed Inventory (VMI)System so as to achieve cost reduction as well as enhanced level of service.
3. To suggest a model for vendor evaluation, relationship management and enhanced level of integration across the underlying Supply Chain (SC).
4. To carry out the portfolio analysis for carrying out risk management finding out areas of vulnerability and device purchase strategy.
5. To redesign procurement processes of Indian Railways in the light of best practices of procurement and Supply Chain Management (SCM) so as to achieve enhanced level of functionality under public procurement environment.
6. To develop a model so as to make procurement as driver of Supply Chain Management (SCM).

3.5 Research Design

3.5.1. Literature Review

Literature has been reviewed on different facets of supply chain, service quality and important perspectives like vendor managed inventory, requirement driver (pull) supply

Supplier Relationship Management (SRM), Multi-criteria decision making. Insights from the literature helped identify the gaps in the literature and led to framing of the research questions and developing a methodology for the present work. For the purpose of this thesis, the literature review served as a deductive process providing constituents of theoretical relationships for empirical modelling.

3.5.2. Exploratory Interviews

From the literature review, it emerges that studies on various issues like Supply Chain (SC) in Public Procurement (PP), Vendor Managed Inventory (VMI) in public procurement, requirement driven (pull system) supply, Supplier Relationship Management (SCM) policy actions in public funded procurement system are a missing link in the literature. The significance of exploratory interviews increases when the literature lacks theoretical models on issues being researched (Seth et al., 2006a, 2006b,2006c) and also when the literature does not fully explain the contours of the problem being examined (Forza, 2002). Taking a cue from the methodology suggested (Churchill, 1979; Gerbing and Anderson, 1988), we drew up a list of potential questions from the literature review for conducting exploratory interviews. We conducted exploratory interviews with practitioners working at senior level, and executives involved as a stake holder. The objectives of our exploratory investigations were to understand:

- The structure and functioning of the Indian Railways Materials Management department's Functions of various railways and production units.
- The interplay of idea, concerns, updating and solutions for addressing quality and timely needs of client department.
- The challenge and various linked perspectives for nurturing supplier relations management and technology management in a public procurement organization.
- Identifying gap between perception and expectation.

The exploratory interviews provided with valuable insights, which helped supplement the literature and understand more fully the problem under investigation. All the practitioners and scholars concurred on the importance of supplier relation management in coming up of supply chain solutions. The learning derived from the review of literature and exploratory interviews culminated in the conceptualization of the framework for the research. Table 3.1 shows description of exploratory interview and elaborates on data sources and associated issues of discussion.

Table 3.1: Sources of Data

Source of Data	Methods
Indian Railways	
Government of India Officials in ministry of railway Members of railway board	Five Semi-structured interviews Documents in the form of policy statements. Focus group interview
Public Procurement in Indian Railways	
Officials at zone level Officers of the Indian railway service Officials involved in functional tasks	Two workshops during January 19-23, 2015 and July 06-10, 2015. These were conducted in a Delphi method manner
Procurement in Private Organization- Maruti Suzuki India	
Maruti Suzuki procurement practices	Site visit and discussions with officers of Maruti Suzuki India
Procurement professionals of IR	Survey of 167 officials involved the material management processes for gauging gap between expectation and perception of supplier quality in the bi-directional relationship between supplier and IR. For this purpose tool developed by Prakash (2011) has been used.

Table 3.2: Participant Profile in Workshop on Supply Chain and Inventory Management during January 19-23, 2015

SN	Name	Designation	Railway
1	Shashi Prakash Dwivedi	Chief Materials Manager-III	East Coast Railway, Bhubneshwar
2	Rajneesh Gupta	Chief Materials Manager /BI	Eastern Railway , Kolkata
3	Devendra Singh Jangpangi	Chief Materials Manager /C	West Central Railway, Jabalpur
4	Bijay Kumar	Chief Materials Manager/E	East Central Railway, Hajipur
5	Vinod Kumar Langan	Chief Materials Manager	North Western Railway , Jaipur
6	Arun Mehta	Chief Materials Manager /Mech	Western Railway, Mumbai
7	G.V. Narayana Murthy	Chief Materials Manager /E	South Central Railway, Secunderabad
8	V Vishwanatha Reddy	Chief Materials Manager /CN	Southern Railway, Chennai
9	Rajnish Kumar Sinha	Officer on Special Duty /IT	Northern Railway, New Delhi
10	Ravi Shekhar Sinha	Chief Materials Manager (S)	South Western Railway , Hubli
11	Sharat Kumar Sinha	Chief Materials Manager /G	South Eastern Railway, Kolkata
12	Dhirendra Kumar Srivastava	Chief Materials Manager	Central Railway, Mumbai
13	Ghanshyam Tamsoy	Chief Materials Manager	North East Frontier Railway, Guwahati
14	Shashi Prakash Dwivedi	Chief Materials Manager-III	North Eastern Railway, Gorakhpur

Table 3.3: Participant Profile in Workshop on Supply Chain and Inventory Management II duringJuly 06-11, 2015

SN	Name	Designation	Railway
1	Sitaram Sinku	CWM (Main)/KGP/WS	South Eastern Railway
2	P C Mishra	CMM(M)/GRC	South Eastern Railway
3	Angshuman Sarkar	FA&CAO/SG	Eastern Railway
4	Sidharth Sharma	COS/JMP/Kolkata	Eastern Railway
5	A K Sharma	CEDE	Eastern Railway
6	Sanjay Deep	CEE/W/CCG	Western Railway
7	Uday Borwanker	CMPE(Dsl.)CCG	Western Railway
8	Om Prakash	FA&CAO (W&S)/CCG	Western Railway
9	P.Ananth	CME/M	Diesel Locomotive Works
10	V R Mishra	CMM	Diesel Locomotive Works
11	Navraj Singh Pangtey	FA&CAO/TOT	Diesel Locomotive Works
12	Anand Prakash	FA&CAO/W&AS	Northern Railway
13	Anand Kapoor	CMM	Northern Railway
14	N. M Shaw	Executive advisor	Maruti Suzuki
15	Vijaya Krishna Kandula	Deputy Manager- Pant Control	Maruti Suzuki

Table 3.4: Participant Profile in Workshop on Inventory Management at Maruti Suzuki India Limited, 11 July 2015

SN	Name	Designation	Rly
1	S. Mookerjee	Director General	National Academ of Indian Railways
2	Atul Gupta	Sr.Prof. Material Management	National Academ of Indian Railways
3	Sitaram Sinku	CWM (Main)/KGP/WS	South Eastern Railway
4	P C Mishra	CMM(M)/GRC	South Eastern Railway
5	Angshuman Sarkar	FA&CAO/SG	Eastern Railway
6	Sidharth Sharma	COS/JMP/Kolkata	Eastern Railway
7	A K Sharma	CEDE	Eastern Railway
8	Sanjay Deep	CEE/W/CCG	Western Railway
9	Uday Borwanker	CMPE(Dsl.)CCG	Western Railway
10	Om Prakash	FA&CAO (W&S)/CCG	Western Railway
11	P.Ananth	CME/M	Diesel Locomotive Works
12	V R Mishra	CMM	Diesel Locomotive Works
13	Navraj Singh Pangtey	FA&CAO/TOT	Diesel Locomotive Works
14	Anand Prakash	FA&CAO/W&AS	Northern Railway
15	Anand Kapoor	CMM	Northern Railway

3.5.3 Workshop Outcomes

The suggestions received from the participants are elaborated in table 3.5 and subsequently discussed under various sub themes.

Table 3.5: Key Outcomes in terms of Present Systems and Suggestions for its Improvement

SN	Present system	Suggestion
1	In new Mechanical/Electrical projects which have substantial material requirement after completions of project. No adequate weightage is given to stores at project.	Senior officers should be associated while initiating the project. There should be separate budget for the modernization of stores depot in PH 42. Presently workshop item gets more priority and depot items are not included.
2	Divisional stores officer are doing only local purchase of mainly non stock items & rate contract items. There is no significant involvement in train operations	Divisional depot should be opened. For opening of such depot target should be given by railway board to GM so that adequate fund is provided for creating such infrastructure. Divisional stores officer should be given powers to procure all non-stock requirements of divisions as per the purchase power of head quarter officers. Recommendation of RRC chapter 13 should be implemented.
3	No SD to be taken form RDSO approved sources, and pre dispatch inspection should be avoided.	Approval by RDSO is enough to take care of both of the above issues. However, in case of failures RDSO has full powers to down grade/ de list the firm. If required RDSO can ask all the approved vendors to submit BG for sufficient value depending upon status of the firm, so that it can be encashed if required.
4	**E-auction** item lot formation and SRO (sale release orders) is still being done manually. It take time since it is still not integrated with custodian dept. and finance dept. This takes lot of time and also prone to typing errors giving scope for delay & dispute.	SRO is prepared by stores and vetted by stores finance/ISA. ISA is already on e-auction module and digitally givens Bid sheets. Only making a form for making SRO on IREPS will expedite delivery by 7 to 10 days since all branch officers can download SRO from their location and download SRO on receipt of SMS alert from IREPS and arrange delivery without losing time.
5	Presently the purchase orders for	Should have a system where each consuming Dept reviews all

	NSTK items get delayed for want of funds. Sometimes even payments get delayed after supplies, for want of funds.	outstanding Non stock requisitions preferably or as on April of the year) and certifies availability of funds. (all indents including old- on ZBB pattern). Based on this the funds to be set aside and P O can be vetted before release of PO.
6	Operation of +_ 30% option clause requires prior finance concurrence	Should be within competence of TAA/CA.

Other Suggestions

Anti-competitive behaviour such as cartel formation and existing tools to tackle it are inadequate.

That the system for vendor approval is faulty and anti-competitive, causing inefficiency and monetary loss to the Railways. Prima facie, there are many more qualified suppliers for most of the items than what appear in the approved lists. Industry may be reluctant to invest due to existing approval based purchasing system.

The number of approved vendors has also remained small in most cases which sometimes is by choice as the approving authority may be putting a cap on the number of vendors to be retained. For some items, the number of approved suppliers is only one or two, leading to inadequate competition due to oligopoly where the market gets inclined towards collusive equilibrium.

It is alleged that the system of vendor registration has given rise to cartel formation and the Railways in the process buy at higher rates manipulated by vendors. The cartel formation is facilitated by existences of the restricted number of approved suppliers, who have little fear of others joining in. Further the existing incumbents, both approved vendors as well as source selection authorities, have incentive to capture the system and resist any change to it. As a long term objective, the vendor approval system should be discontinued and Railways should gear up to purchase based on qualifications criteria. In the near term, however the system followed over years may not change immediately and gradual changes could be done in following way:

The system of vendor approval by Railways Design and Standard Organization (RDSO) to be discontinued and Railways Design and Standard Organization's (RDSO‟s) function Thought to be limited to framing the specification and standards for vendor approval (in the longer term Railways Design and Standard Organization (RDSO) should make the qualification criteria). Other functions should be taken over by the PUs/Railways. Approval of vendors for all items, including safety items is decentralized to Zonal Railways and Production Units. They should approve the vendors themselves. They should take help from other inspecting agencies in the country like RITES, SGS etc. Specialist advice may however be sought form Railways Design and Standard Organization (RDSO) where required.

The current system of vendor approval (designed and implemented by RDSO) has three tier prequalification, level I and level II. This may be simplified to have only one category - an approved vendor should have no quantity restriction. What quantity to allot to a bidder, if at

all, depending on his qualification (including past performance), should be decided by the tender committee, who are in the right place to take this decision.

Delay in finalization of Expected Annual Consumption (EAC) of "A" category items become demand needs to be vetted at Divisional level as well as Head Quarters (HQ). Implementation of zero-base budgeting for "A" and "B" category item matching budgeting provision (PU27, 35) along with of Expected Annual Consumption (EAC) value. Waiver of Security Deposited (SD) can be decided with the approval of COS. Tender opening time should be reduced from minimum 30 days to 15 days.

Lot of confusion in case of part-I & Part II ordering where Ministry of Micro, Small and Medium Enterprises (MSMES) firms are involved. Uniform procedure order is required for compliance of directives.

Ordering of safety items get delayed due to requirement of security deposit. Improving logistics to various depots by applying principles of Third Party Logistics (3PL).

Railways Design and Standards Organization (RDSO) while revising the specification of any items should also indicate the estimated financial repercussion on this account. This should appear in Railways Design and Standards Organization (RDSO) approved vendor directory.

Suggestions for Improvement of Supply Chain Management of Traction Energy

(Key objectives to achieve: reducing and rationalizing cost of power; improving the efficiency of energy consumption (Traction and non-Traction); increasing the spread of renewable and clean energy)

Reduction of Electrical Energy Bill (controlling supply chain management of electrical energy generation, transmission, distribution and purchase)

A model for electrical power energy purchasing directly from generating units across India through Central Transmission Units/ State Transmission Units after paying free wheel charges should be adopted by Railways to reduce energy unit cost by approx. 30%. The energy cost will further reduce if the Indian Railways migrates from Distribution Companies (DISCOMs) to Generating Companies (GENCOMs).

As per Supreme Court order, cross subsidy charges should not be more that 20% of cost of procurement by Distribution Companies (DISCOMs). It will reduce present unit costs in many states in India.

Replacing conventional rakes by Mainline Electric Multiple Unit / Diesel Electric Multiple Unit (MEMU/DEMU) where there is short stoppage like in Bihar.

IR should work on a model to purchase electrical energy from generating units based on more than one state jurisdiction so that Central Electricity Regulatory Commission(CERC) should not come in to the picture for tariff calculation and onlyCentral Electricity Regulatory Commission(CERC) to decide tariff.

Indian Railways should also explore purchasing of power from exchange at competitive tariff rate so that the advantage of having very low tariff during night can be taken.

Provision of Availability Based Tariff (ABT) meters with communication facilities along with CT&PT of 0.2S class at each TSS (Traction Sub Station) should be required for getting power from nearest CTU/STU transmission lines. Railways should explore installation of short distance transmission lines for connecting Indian Railways Traction Sub Station to CTUs/STUs transmission lines for traction purpose.

Power from a given point can be taken through Power Purchase Agreement and consumed at any desired location by paying wheeling charges for the distribution network connecting the two points. Representations against cross-subsidy to be filed with Central/State Regulatory authorities for waiver by Zonal Railways /Production Units.

Budget provision should be made for procurement of Availability Based Tariff (ABT) meters. There is an ambiguity in the allocation for procurement of such meters: clarification required, whether chargeable to Abstract E or H?

Study of geographical distances to be covered across Railways to carry out assessment of transmission network requirement for connecting directly to GENCO through Railway's own transmission network.

Reduction of Electrical Energy Consumption on Line

- Conventional locos should be replaced by regenerative breaking 3-phase locos.
- Loco link rationalization
- Crew link rationalization
- Up gradation of drivers training – During simulator training, loco pilots should also be graded for energy efficient driving technique and marking for this should also be in corporate.
- Driving techniques for passenger loco pilots should be monitored and analyzed for a given section to improve driving techniques to reduce loco energy consumption.
- Right powering of locos.
- Locos utilization should be improved and locos should not be idle.

Use of Environment Friendly Non-Conventional Source of Energy like Solar Power and Wind Power

Capital cost of solar power generating unit is high. Solar photo voltaic cell without battery should be used which is in long run is cost effective.

On experimental basis, solar panels are provided in a coach. In the new coach if the roof top surface is replaced by solar thin film panels or solar panel than per coach tear weight will be reduced compared to this experimental train.

Wind power plant should be used where wind speed is relatively high and using national grid power can be used anywhere in Railways.

Roof top solar power should be provided for offices.

Other Measures

LED lights should be used in offices, stations, coaches etc.
Occupancy sensors should be used in offices for automatic switching OFF light, fan and AC.
Pre-paid energy meters in residential colonies should be used to reduce power theft.
Timers in street light.
Internal energy auditors should be used for energy auditing by giving them some incentives.

Supply Chain Management of Fuel (Diesel)-Rationalizing the Inventory at RCD's; (concept of vendor managed inventory; redefining the point of sale of fuel; improving SFC (Specific Fuel Consumption)).

Reduction of HSD Oil - Controlling Supply Chain Management of HSD Oil

A model of Railway Container Deports (RCD) should be adopted by Railway in which the supplying company and will own the installation and maintain it. Inventory will also be under the oil company. The Company will supply High Speed Diesel (HSD) Oil to locomotives at fuelling point development. For this, modality should be developed with use of Information Technology (IT) and Electronics.

A Memorandum of Understanding (MoU) should be signed between Oil Company and Railways for effective fire fighting at Railway Container Deports (RCD).

Locomotive should be given High Speed Diesel (HSD) at a Railway Container Deports (RCD) where High Speed Diesel (HSD)oil prices are minimum. However need of trip ration and minimum fuel balance should be kept in view.

Use of Information Technology (IT) to pair fuel dispensing with fuel received in fuel tank of loco.

Improving of Specific Fuel Consumption (SFC) of Locomotive

Provision of Auxiliary power unit electronic injection system, common oil direct injection system, multi grade oil. Proliferation of hotel load locomotive and High Horse Power (HHP) locomotive.

Reduction of fuel consumption on line

Loco link rationalization

Crew link rationalization

Up gradation of drivers training – drivers are to be trained for new locomotives. For this, training needs are to be assessed and facilities like loco simulator for new locomotives should be provided.

Sequencing of the trains should be done so that there are minimum halts of trains on line.

Provision of hotel load locomotives on end on generation trains. By this power car can be removed.

Identifying and removal of temporary and permanent speed restrictions.

Strengthening of fuel cell organization at Divisional as well as at headquarter level so that a close watch can be kept on trip ration and the performance of the drivers.

Guidance for optimized loco driving (GOLD)

Other Measures

Use of alternative fuels like bio-diesel, Liquefied Natural Gas (LNG) etc.

Improvement in the design of rolling stock to make them more aerodynamic.

Ensuring spillage-free environment through improved dispensing techniques

Supply Chain Management of Spares (synergy between out turn target, capacity of workshops/sheds & budget management, best industry practices, benchmarking, business process reorientation of railway supply chain)

Long Term Contract: :Long term contracts for complex/technological items can be considered. Rates can be negotiated every year with handholding of firms for reduction of cost, modification/ change in specifications etc. Framework Agreement guidelines are required from Railway Board, for exploring possibilities of long-term contracts.

Vendor Managed Inventory: An initiative may be taken under which inventory of shelf life items and spares with high turn-over would be maintained by vendors at their premises and

would be supplied to workshops/depots as per its need. Vendor Managed Inventory, as that of Maruti can be tried. We can have a tender condition for maintaining one month inventory with the supplier. There has to a centralised storage of material in workshop with the stores depot and workshop internal depot being merged.

Procurement through e-commerce sites: For Low Value items (<Rs.50, 000) of general nature, procurement may be permitted through e-commerce sites. Imprest account for this purpose with net banking facility can be created. Necessary guidelines are required from Railway Board.

E-procurement and i-MMIS: EPC mode of procurement is required to be included in the e-procurement system. Vendor-rating system can also be part of i-MMIS, with the formula already suggested by Railway Board. For this, the Quality of Goods/Services provided is to be captured by the system. Finally, Vendor Rating should combine Price, Delivery and Quality ratings through i-MMIS.

Unification of PL numbers: Unified Price Ledger (PL) Numbers are to be used by i-MMIS. For Price Ledger (PL) unification a timeline is required. All temporary Price Ledger (PL) numbers have to be closed after a certain cut-off date; with no procurement in temporary Price Ledger (PL) nos. Without unified Price Ledger (PL) numbers the Enterprise Resource Planning (ERP) implementation may not be possible.

Procurement up to Rs.15000 on single quotation: Railway Board may issue powers for procurement on single quotation up to Rs.15, 000 by all officers as provided in General Financial Rule (GFR).

Budget: The Anticipated Annual Consumption (AAC) value is not matching with Grant Purchase (GP) Stores Value in many workshops. Critical review of Anticipated Annual Consumption (AAC) and linking it with budget availability is required for prioritization. Out-turn targets should be fixed in time and be realistic (based on capacity of workshop) and linked with provision of funds. Capacity can be sent suo-moto by workshop to respective director in Railway Board and based on which Target can be set by Railway Board. Initially for major workshops, periodicity can be fixed, linking the same with timelines so that outturn is synergized with budget. Advance grant should be a function of projected purchase of next year. Budget Module in i-MMIS can be used effectively. The Centre for Railways Information System (CRIS) can strengthen it. Railway Board should earmark 50 workshops

in Indian Railways to have budgetary systems (Production Plan-ZBB etc.) as that of Production Units. For regular review a Portal has to be there. This can be there in i-MMIS. For small value items, quarterly/half-yearly procurement should be done, as due to improved IT systems, decision making is fast. Instead of Anticipated Annual Consumption (AAC)we can use Maxima-Minima system for such items.

Rate Contract**:** Rate contracts to be entered into for more number of items, especially for Propriety items. Railway Board to nominate Nodal Railways item-wise for various RC items.

Approved Sources and Vendor Development: Distinction between Railway Design and Standard Organization (RDSO) Part 1 and Part 2 sources should be reviewed and there should be only one approved list and one development list. There has to be expression of Interest for new items for development. In a tender, a supplier giving suggestion/innovations in the item being procured has got no incentive. The offer is considered unsuitable. Guidelines are required for encouragement of bidders/suppliers, in suggesting product improvements, so that they become partners on progress. For Indigenous Source Development under "Make in India", incentive can be given for indigenous development of an item, considering the level of investment.

Security Deposit: Requirement of Security Deposit (SD) before placement of Purchase Order (PO) for safety items to be reviewed. Suggested alternative is one time Security Deposit (SD) by Railways Design and Standard Organization (RDSO) or Approving agencies. Standing Security as Security Deposit (SD) can be taken.

Inspection of material: Inspection for Railways Design and Standard Organization (RDSO) approved items and from reputed sources should be against firm's Warranty Test Certificate (WTC). Railways Design and Standard Organization (RDSO)/Approving agencies to inspect the firms periodically. Instead of inspection, material can be accepted on Warranty Test Certificate (WTC). Audit can be done for compliance occasionally.

WTA Items: Old Indents for Wheel Tyres and Axils (WTA) and steel items to be reviewed periodically to dovetail the indented qty with current requirement to avoid overstock.

3.5.4 Value Chain of Inbound Flow of Material

On Indian Railway material management department deals with the integrated concept of material from assessment of need forecasting material planning, procurement, quality assurance, receipt of material, inventory management distribution for purpose of consumption

and recycle/disposal of release material. On Zonal Railways the material need arises in Maintenance Repair and Overhaul (MRO) activities of maintenance, repair and overhaul of rolling stock, where as in production units material need arises for production of rolling stock. The total annual value of procurement on Indian Railways is Rs.42000 Crores per year. There are 250 ware houses material management, contract negotiations, inventory management, supplier relation management etc. All these activity has to be done to satisfy the principal of public accountability of all stages of transaction relating to purchase, storage, issue and disposal.

The items which are regularly required are made stock items and there are certain item which are as and when required on need basis are procured as non-stock items. For a stock item a unique item code is given which is called PL number (Price Ledger Number). Semi significant system of coding is used for assigning PL number to an item. There are total 8 digits in PL number. First two digits are called major Price Ledger (PL) group it signifies the main equipment next two digit signifies sub assembly, next three digits are running serial number and last digit is a check digit. In Controller of Stores (COS) office the various items are distributed in different purchase sections classified on the basis of major Price Ledger (PL) group. The annual procurement system is followed. Estimate sheets of stock items are generated through Material Management Information System (MMIS) annually on predefined schedule. This estimate sheet consists of information of past trend of consumption, stock available and dues in pipeline. This information helps in forecasting the requirement and assessment of need. Railway Design and Standard Organization (RDSO) is the Research and Development (R&D) organization of Indian Railways with major role of developing and maintaining standard and specification which ensure integration of different technologies. Railways Design and Standard Organization (RDSO) approves the vendor for supply of material to Indian Railways and wagon manufacturers of Indian Railways. After consolidating the requirement and competent approval, a tender notification is issued for purchase of the material. The bids are open on prescribed tenders are evaluated by purchasing officer/purchasing committee. The contract is awarded to successful bidder after following due procedure and competent approval. Material is supplied by the contractor as per the terms and conditions prescribed in the contract to the consignee ware houses. Where it is inspected accepted stored and distributed to the internal customer.

Chapter Summary

This chapter began with methodological approach followed to carry out this research work. Further, the research methodology covers in detail the identification and finalization of issues related with vendor assessment, inventory management, supplier relationship etc. The next chapter will cover assessment of procurement processes of the IR.

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