## **INDEX OF FIGURES**

SN	Figure Number and Title	Page No.
1	Figure 1.1 Organization Structure of the Material Management Department in the IR	11
2	Figure 1.2: Scope of the Study (Procurement Issues across Network of Linkages)	18
3	Figure 1.3: Scheme of the Thesis	19
4	Figure 2.1: Purchasing Portfolio Analysis	26
5	Figure 2.2 Integrated Approach of the Study	44
6	Figure 3.1: Flow of the Study	61
7	Figure 3.2: Research Process of the Study	62
8	Figure 4.1: Vendor Prequalification and Approval Process	79
9	Figure 4.2: Framework of Inbound Supply Chain of a leading Automobile Company	89
10	Figure 4.3: A Typical Cycle of Procurement Process of Indian Railways	90
11	Figure 4.4 A Typical Procurement Cycle Time of the Indian Railways	90
12	Figure 4.5: Flow chart for High Speed Diesel recoupment	101
12	Figure 4.6: Schematic diagram of AC traction on IR	109
13	Figure 4.7: Cost of Electrical Energy.	111
14	Figure 4.8: Result of Normality Test of Data for Various Substations	112
15	Figure 4.9: Normality Assessment for Aggregated Data	112
16	Figure 4.10: Functioning of a Typical Power Exchange	117
17	Figure 5.2 Key Performance Indicator	124
18	Figure 5.3 Typical Costs and Customer Service Relationship	126
19	Figure 5.4 Framework for Procurement Indian Railway (As Is SYSTEM)	128
20	Figure 5.5 Proposed VMI based To Be System for Procurement in the Indian Railways	131
21	Figure 5.6 Implementing 3PL Systems in IR	132
22	Figure 6.1 Supply Chain Maturity Model	137
23	Figure 6.3: Snapeshot of Material Management Information System of IR	143
24	Figure 6.4: Snapeshot of Computing Vendor Rating	144
25	Figure 6.5 Purchasing Portfolio Analyses	146
26	Figure 6.6 Typical Lead Time Associated with Procurement	154
2 <b>7</b>	Figure 6.7 Processes Mapping of Procurement Of The Indian Railway	154
28	Figure 6.8 Business Process Renovation-Renovated Business Model	156
29	Figure 7.1 Workflow of the Study	170

## **INDEX OF TABLES**

SN	Table Number and Title	Page No.
1	Table 1.1: The Evolution of the Indian Railway at a Glance	2
2	Table 1.2: Working Expenses share	5
3	Table 1.3: The Indian Railway at a glance	8
4	Table 2.1: Broad Themes of the Literature	24
5	Table 3.1: Sources of Data	65
6	Table 3.2: Participant Profile in Workshop on Supply Chain and Inventory	65
	Management	
7	Table 3.3: Participant Profile in Workshop on Supply Chain and Inventory	65
	Management II during July 06-11, 2015	
8	Table 3.4: Participant Profile in Workshop on Inventory Management	66
9	Table 3.5: Key Outcomes in terms of Present System and needed Improvements	66
10	Table 4.1: Comparision of KPIs for Procurment Cycle	91
11	Table 4.2: Diesel Consumption Profile (Mysuru Division of South Western Railway	102
12	Table 4.3: Description of a typical Diesel Fuelling Station at Arsikere, Karnataka	103
13	Table 4.4: Description of a typical Diesel Fuelling Station at Sakleshpur, Karnataka	103
14	Table 4.5: Description of a typical Diesel Fuelling Station at Chickjajur, Karnataka	104
15	Table 4.6: Select Issues for Management of HSD Oil	105
16	Table 4.7: Electricity Supply Rates of Various Distributor Companies	106
17	Table 4.8: Key Insights derived during Workshop on Supply Chain of Electricity	107
18	Table 4.9: Details of Traction Substation as on 1.4.2014	110
19	Table 4.10: Statistical Summary for Contract of Power Drawn At Various Locations in	114
	Central Railway, Mumbai Suburban Substations	
20	Table- 5.1 Material and Inventory Management Statistics in the Indian Railway	122
21	Table: KPI and Associated Performance Measures	125
22	Table 5.2 Availability of Stock Item, Inventory Balance and Over Stock	127
23	Table 6.1 Select Selection/Evaluation Methodology	139
24	Table 6.2 Suggested Vendor Rating Systems in IR	140
25	Table 6.3 Components of Service Rating	142
26	Table 6.4 Components of Vendor Rating	142
27	Table 6.5: Aggregated Vendor Score and associated Classification	143
28	Table 6.6: list of strategic, leverage, bottleneck and routine items	147
29	Table 6.7: Indicative List of Strategic Items	147
30	Table 6.8: Indicative List of Leverage Items	149
31	Table 6.9: Indicative List of Bottleneck Items	150
32	Table 6.10: Indicative List of Routine Items	151
33	Table 6.11 Lead Time of Procurement	153
34	Table 6.12: Results of the Test for Reliability Analysis	159
35	Table 6.13: KMO and Bartlett's Test	160
36	Table 6.14: Communalities, Factor Structure and Loadings for Items of Service	160
	Quality	
37	Table 6.15: Results of the Test for Reliability Analysis	161
38	Table 6.16: Comparison of Service Quality Offered by Supplier Perception vs.	162
	Expectation Scores	
39	Table 7.1: Mapping of Research Objectives with Deliverables and Implications	171
40	Table 7.2: Quantum of Work	172