

Supply Chain Management- Indian Railways

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Abstract— Indian Railways is one of the biggest organisation of Government of India employing nearly 14 lakh persons and having annual Budget of nearly Rs 1.05 lakh Crores. Railways has a large number of assets which are to be maintained as per the maintenance schedule to run the trains efficiently and has to regularly add on to its capacity by manufacturing nearly 500 locomotives and 3000 coaches every year. Nearly 20% of the Railways Budget and assets are being utilized for the procurement and management of the material for regular maintenance and production. The importance of procurement process in Indian Railways can be understood from the fact that a separate service, "Indian Railway Stores Services" has been created in Indian Railways. Engineers are recruited through UPSC for this service and entrusted with the job of managing the procurement system and ensure availability of material for maintenance and production.

With the reducing Budgetary support and increasing cost of fuel prices with limitations to raise the fares due to social obligations, it is the call of hour that railways think out of the box to make their systems more efficient, rightsize the organization, critically examine procurement, manufacturing and maintenance practices to do away with redundant procedures. Appreciating the volume and value of purchases, it is necessary to have a relook at the supply chain system of Railways and use the latest concepts in supply chain management to reduce the wasteful expenditure and give it a lean and mean look.

Supply chain Management has become one of the most efficient way to rightsize an organization. Supply chain for products may be reworked in a scientific manner to manage inventory, to exploit backward integration with supplies, to satisfy the needs of end users and to maintain a fine balance between availability and utilization of material. Unnecessary procedures which don't make positive contribution to the system, may be done away with, thereby releasing some manpower who may be redeployed to more productive places.

Through this paper we would take a look at the existing supply chain system of Indian Railway through a case study of Diesel Locomotive Works Varanasi, one of the production units of Indian Railways manufacturing nearly 250 Diesel Locomotives every year. DLW follows Bill of Material (BOM) based demand system with annual procurement and periodic replenishment. We would critically analyse the pitfalls in the system and suggest methods to improve the system with minimum changes.

Keywords— Locomotives, Railways, Rightsize, Supply chain management.

I. INTRODUCTION

SUPPLY chain management may be described as natural extension of the downsizing and reengineering for cost cutting measures. The term "supply chain management" was

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coined by Keith Oliver, a consultant at Booz Allen Hamilton (now Booz & Company), who used it in an interview for the Financial Times in 1982.

A customer-focused definition is given by Hines (2004tp76), Supply chain strategies require a total systems view of the links in the chain that work together efficiently to create customer satisfaction at the end point of delivery to the consumer. As a consequence, costs must be lowered throughout the chain by driving out unnecessary expenses, movements, and handling.

II. INDIAN RAILWAYS

Indian Railways is one of the biggest employer in India with a staff strength of around 1.4 millions and has a network of around 64000 Route Kilometers out of which around 36% is electrified and remaining is non electrified. Diesel and Electric tractions coexist on Indian Railways. Indian Railways runs around 11000 trains every day, of which 7000 are passenger trains which cater to nearly 13 million passengers every day. It has more than 7500 locomotives, 37800 coaching vehicles and 3,22,147 wagons.

For maintenance of existing resources and manufacture of new locos, coaches, wagons and for additional infrastructure requirements, Indian Railways procure many items every year. Indian Railways is procuring item worth more than Rs 31359 Cr (including fuel) every year and around 28000 employees including officers and staff are involved in it. Indian Railways is cash starved and is looking for ways to improve its operating ratio (expenditure/ earnings). A major portion of expenditure may be attributed to salary of its work force which is nearly 14 lakhs.

III. OBJECTIVE

- The objective of this study is to analyse the supply chain of Indian Railways and to suggest ways to improve the procurement system, quality of products and to reduce the inventory and manpower associated with the supply chain management to give it a lean and thin look and to improve the operating ratio (expenditure/earnings) of organization.

IV. METHODOLOGY

- Case study of DLW, one of the manufacturing units of Indian Railways has been done regarding Supply chain Management to draw inferences which may be applicable for Indian Railways with minor modifications. Secondary data has been collected from DLW, Varanasi for analysis of the supply chain system.

V. DIESEL LOCOMOTIVE WORKS, VARANASI

Situated on banks of Ganga, DLW, Varanasi was established by Indian Railways in association with American Locomotive Company (ALCO) to manufacture Diesel Electric Locomotives for Indian Railways. Over the years DLW Varanasi has supplied more than 4000 locos to Indian Railways, Myanmar, Bangladesh, Mozambique, Senegal, Srilanka, Vietnam, Malaysia and other countries apart from PSU's like SAIL, JNPT, NTPC etc.

Towards end of 20th century, DLW entered into a TOT agreement with M/s EMD, USA for manufacture of High Horsepower Locomotives with AC-AC technology which are more fuel efficient and less maintenance intensive.

Stores department of DLW is responsible for procurement, receipt, storage & supply of a large number of spares, raw materials required for production of ALCO & GM Locomotives & maintenance of assets at DLW as well as procurement of centrally indented items and their supply to Zonal Railways Total strength of Gazetted Officers is 37 and total staff strength is 692. Out of these 692 staff, 529 are involved in Inventory Management after receipt from supplier and 163 are involved in placement of order.

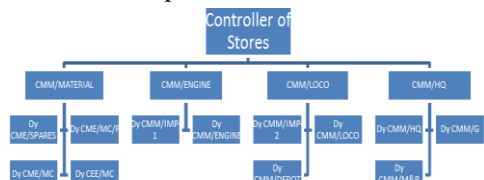


Fig. 1 Organisation chart of Stores Department of DLW

DLW follows an 'e-procurement system' to increase transparency in tenders & contracts. Web based E-procurement of Indian Railway (www.ireps.gov.in) has been rolled out at DLW on 26.10.2008. Now 100% tenders are being done through this system only.

TABLE I
TENDER DETAILS OF DLW

Year	Limited/Single Tender	Advertised Tender	Total
2008-09	201	12	213
2009-10	1175	175	1350
2010-11	3088	495	3583
2011-12	2201	646	2847

VI. PROCUREMENT PROCESS

- Identification of items and their procurement as per the production plan for 1 year. Annexure- I
- Depending on Lead time of item procurement action is initiated for an item. Procurement calendar of DLW has been prepared for same. Annexure -II
- Depending on urgency of procurement and whether item is of safety category, decision is taken for procurement of same through Open tender, Limited tender or Single tender.
- Notice is displayed in leading newspapers and website.

- After opening of tender, offers are compiled and tabulated statement is sent to Finance Department for vetting.
- Vetted tabulated statement along with offers is handed over to a Tender Committee who diligently recommends further action based on justification of rates and quantity to be procured TC recommendations are put up to Tender Accepting Authority who has the power to accept/reject/modify the TC recommendations.
- Purchase Order is placed on the Vendor who is required to submit a Performance Guarantee Bond within a specified period.
- Material is inspected at firms premises or on receipt at DLW as per PO conditions for conforming to requisite standards.
- Material is taken into account and kept in safe custody in Depot for issue to users on demand

While procurement cycle for small value items may get completed quite early, the cycle for higher value items takes a lot of time. Tender accepting power for procurement cases above Rs.100 Cr is with Railway Board and hence such cases are sent to Railway Board by respective Railways. At Railway Board, TC recommendations are further analyzed and then acceptance are given. It has been noticed that in some complicated cases, cases may take even 2 years to get finalized.

For year 2012-13, DLW's Procurement Budget was Rs.3070.84 Cr. During the year 5678 tender cases were awarded for stock items. PO value was Rs.5100 Cr. Similarly 1552 cases of Non stock items were finalized Rs.35 Crs.

TABLE II
NUMBERS OF PURCHASE ORDERS PLACED DURING LAST TWO YEARS BY DLW

No. orders placed	2011-12	2012-13
No. of Purchase order placed	6003	7230
No. of AT (Advertised tender)	717	813
No. of GT (Global tender)	297	321
No. of BT (Bulletin tender)	367	378
No. of LT (Limited Tender)	4032	5718

VII. ANALYSIS OF PRESENT PROCUREMENT SYSTEM

Indian Railway has a traditional approach of procurement which is summarized as MDC i.e. Management direction and control to minimize risk.

Characteristics of this system are:-

- The owner knows more than the expert vendor (impossible if the vendor is good at what they do).
- The vendor does not know his work.
- The vendor is reactive to the owner.
- The vendor has to think in their own best interest, because that is what reactive, directed workers do.
- The owner is micro managing and is responsible for performance of the vendor.
- The owner no longer knows what he does not know.

VIII. PITFALLS OF CURRENT PROCUREMENT SYSTEM

- Large set up for routine jobs:- Since procurement cycle is repeated annually, large setup of staff is to be maintained for managing supply chain.
- Higher prices:- Since the tenderers get the PO for supply of items for 1 year, they want to recover investment made on the infrastructure and other overheads during that year only as there is no guarantee that they will receive orders in future.
- Diversification of activities: - Due to uncertainty over future orders, vendors try to diversify in other items of Railways as well as they manufacture items for other sectors too. This diversification leads to change in focus and may sometime lead to deterioration in quality of product.
- Uncertainty over vendors: There is no certainty over vendors, as who will supply the items in subsequent years is not known to anyone. While the item may be prepared as per drawings and specification quality of item may change from year to year.
- Scope of corruption: Uncertainty over future orders lays a perfect breeding ground for corruption.
- There is no incentive to vendor to take long term quality improvement initiatives due to uncertainty over future orders.
- Long time taken to finalize the tenders need to be brought down.
- No control over inventory as the vendors would like to deliver complete quantity of small items in one goes. This necessitates proper storage and safety arrangement.
- Staggered delivery clause becomes very important when items with short shelf are to be procured.
- There is no Quality control over process and only product can be checked for quality as vendors involved in manufacturing many different items for various agencies may not like to make changes in their process to suit Railways.

IX. POSSIBLE SOLUTIONS

In the present lowest bid procurement system, the owner is not able to utilize expertise of the vendors. Vendors also depute only those personnel who are willing to be managed, directed and controlled (MDC). Modern methods of procurement are PIPS and BVPIPS

- Performance Information Procurement systems

PIPS consists of three phases: the Selection Phase; the Clarification Phase and Management by risk mitigation. In this system the vendor is considered to be the expert and his expertise is utilized for risk mitigation and technological development.

- Best Value Performance Information Procurement System (BVPIPS)

It is a business and leadership mode and a cutting edge technology that looks at factors other than just price, such as quality and expertise, while selecting vendors. This concept is presently being successfully utilized in construction industry.

The procurement system of Railways has been codified and bound by rules and it will be very difficult to change the system completely. Moreover if we take a closer look at the

items being procured, we will realize that a large number of cases pertain to pipes of various sizes, Mild Steel Sheets, hardware etc. Tenders for these common items are floated every year for procurement

DLW presently follows Annual BOM supported indent based procurement system. Annual procurement has been planned to take care of minor technical changes in items. For stock items DLW finalizes nearly 5100 tenders every year.

If instead of Annual procurement we place an order by clubbing the supplies for 5 years over 2 or 3 vendors with staggered supply, the number of tenders will come down to nearly 1100 only which can be managed by much less staff. Entering into a long term contract with staggered supplies may further deliver following benefits to the system:

- Use of technical expertise of vendors for technical advancements/improvements in the item.
- Removal of uncertainty over vendors.
- Infrastructural cost will be spread over larger period by vendors which may bring down price.
- By quality audit at vendors premises, quality of process as well as product may be improved.
- By maintaining a close coordination with the vendors and staggering supplies, inventory inflow may be regulated to implement just in time inventory concept thereby reducing the requirement of storage space and supervision which will further reduce manpower requirement.

X. CONCLUSION

MDC system of procurement which is being followed by Indian Railways has become outdated. Time has come where Railway should review its supply chain and procurement system as per the latest procurement concepts to reap the benefits of inventory control and technological advances. Vendors need to be viewed as experts of their field and ground shall be created to use their expertise synergically to improve the quality of the products and for technological advances. Railways shall create a system to create a win-win situation for vendor as well as Railways. By carefully planning for long term requirements and analyzing the product mix, procurement cycles and systems may be modified to give Railways a lean and thin look and also to find out a solution to the age old struggle of "best price or best quality".

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Appendix-I

Production Plan of DLW

Rly	Type	Type	Actual for 2011-12	2012- 13	2013-14	Buffer (High/Low)	Buffer (High/Low)
						2012-13	2013-14
IR	ALCO	WDM3D-Micro	21	0	0		
		WDS6	6	10	0	2/3	
	HIGH HORSE POWER (HHP)	WDG4	158	175	190	29/44	32/48
		WDP4B	31	0	0		
		WDP4D	0	60	70	10/15	12/18
		WDG5	1	15	30	3/4	5/8
	Sub Total	IR, ALCO & HHP LOCOS	217	260	290		
NRC/Export	NRC	WDG3A (16 Cyl) NTPC/NSPC/SAIL	21	15#	8\$	3/4	½
		WDS6 (6 Cyl) SAIL/TISCO/JSW	18	20 ##	10 S	3/5	2/3
	EXPORT	Bangladesh (16 Cyl, 31000 HP)	0	10	16 S		
		Sri Lanka (2300 HP)	3	06			
	Sub Total	EXPORT & NRC LOCO	42	51	34		
GRAND TOTAL LOCOS (IR, NRC & EXPORT)			259	311	324		

Appendix-II

ANNUAL RECOUPMENT PROGRAM FOR LEDGER SECTION

DEMAND GENERATION DATE	ITEM	GROUP	SUBGROUP	NO OF ITEMS	CONTRACT PERIOD	CONCERNED SECTION
1ST Jan of Previous Year	(A). STATIONARY	83	ALL 1,2,3,4,5,11	106	JAN- DEC	P-7
	(B). TOOLING	72	98,21	52	NOV-OCT	P-15
1ST Feb of Previous Year	1.ALCO PAINTS	77	03,11,19,29,90,98	22	APR-MARCH	P-7
	2.STEEL PLATES	90	ALL	34	APR-MARCH	P-5
		76	ALL	71	APR-MARCH	P-5
		84	ALL	55	APR-MARCH	P-7
	3.ELECTRODES	77	19	01	APR-MARCH	P-7
		72	98	21	APR-MARCH	P-15
	4.ADHESIVE				APR-MARCH	
	5.MTO				OCT-SEPT	
	6.TOOLING					
1ST March of Previous Year	1.SAFETY ITEM	75	03,10,20,32,54,90,98	18	FEB-JAN	P-15
	1.PACKING WOOD ETC	78	ALL 01,35,55	04	FEB-JAN	P-7
	2.TOOLING	72		29	JAN-DEC	P-15
1ST APRIL of Previous Year	(A). CLOTHING, RAINCOAT, UMBRELLA	79	02,04,31,32,51,66,90,98	50	APR-MARCH	P-7
	(B). TOOLING	72		34	FEB-JAN	P-15
1ST MAY of Previous Year	1.BLDG MATERIAL	61	90	08	APR-MARCH	P-16
		62	13,17,31,98	32	APR-MARCH	P-16
	2.CIVIL ENGG. ITEM	72	21,98	43	APR-MARCH	P-15
	3.TOOLING					
1ST JUNE of Previous Year	1.ABRASIVE ETC	70	ALL	74	AUG-JULY	P-16
	2.GENERAL PAINTS	77	ALL 01,03,09,15,90	15	AUG - JULY	P-7
1ST JULY of Previous Year	1.ELECTRICAL (GEN)	40TO 43	01,02,03,11,50,30,98	78	AUG-JULY	P-7
		47	98	53	AUG-JULY	P-7
	1.ELECTRICAL (SHOP)	72	98, 03,05,06,21	127	AUG-JULY	P-15
	1.TOOLING					
1ST AUGUST of Previous Year	1.NON-FERROUS ITEM	91	ALL, 11, 16, 98	07	AUG-JULY	P-5
	2.TOOLING	72	98	10	AUG-JULY	P-15
1ST September of Previous Year	1.CHEMICALS	81	1,3,4,5,7,90,98	54	AUG- JULY	P-7
1ST OCTOBER of Previous Year	A. BRUSHES ETC	71	1,5,7,8,11,98	12	NOV-OCT	P-16
	B. HARDWARE (GEN)	73	38,90	16	NOV-OCT	P-16
	C. LOCK WARE, WIRE ROPE, CHAINS	74	50,98	23	NOV-OCT	P-16
	D. CLOTHING	79	2,3,15,51,66,90,98	17	OCT-SEPT	P-7
	E. SAW DUST & D. OIL	92	11,90	02	JAN-DEC	P-7
	F. TOOLING	72	9,14,15,16,18,20, 21,26,98	97	JAN-DEC	P-15
1ST NOV of Previous Year	A. POL	80	01,03,09,98	34	JAN-DEC	P-7