Study of 'International Business - Spare Part Operation Process' at One of the Large Automobile Manufacturer in India &Reduction in Supply Lead Time

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ABSTRACT

When it comes to international spare part business, companies are facing difficulties in regular operations. Spare part international business operation process is not simple as domestic spare part business. It is mainly due to reducing logistics cost, country specific requirement, customer specific requirement, availability of funds, letter of credit document, government documentation etc.

In this research paper, researcher has worked oncompanies' critical issue i.e. lead time between spare part requirement to supply. Researcher studied "international business - spare part operation process" at one of the large automobile manufacturer in India &found out the solution for challenges. Researcher implemented the solutions which finally bring down the lead time of spare part supply.

This paper help to understand the international supply chain process followed in one of the automobile company in India for spare part business. This paper helps to understand the reason for lead time delay & how lead time improved from current situation.

Keywords: International spare part business, process,lead timeetc

1.   Introduction

As perIBEF automobile industry report (Mar 2019), India is the 4th largest market for automobile in FY17. India is the strong market in terms of export.In India, between Apr 2018 to Feb 2019, automobile export market has grown up by 15.54% year on year. Indian automobile industry with spare part is expected to reach Rs. 16 to 18 trillion by FY 26. Indian automotive industry targeting to increase exports of vehicles 5 times in 2016-26.

As per IBEF auto component industry report (Mar 2019), spare part export will reach to US$ 80-100 billion by 2026. In FY18, India has done US$ 13.5 billion export of spare part. In FY 09, it was only US$ 5.10 billion. There is a 11.42% increase in compound annual growth rate. Spare part export contributes to 26.20% share in overall turnover of spare part industry.

In twentieth century, due to enhanced pace of change in business and shrinkages of profit margin in manufacturing, companies are forced to focus on spare part business. Companies have started focusing on spare part business as it gives higher profit. Current studies show that service in aftermarket and spare part sale contributes to 25% to overall revenue & profit margin is 40 to 50% of manufacturing product. Spare part gives high profitability and its availability became strategic key point in business. These implies push on improvement in spare part operations. Dennis M.J. (2003).

S.M. Wagner (2008)proposed that, spare part business future studies should focus on a particular company at a time. It will help to concentrate on challenges of particular region in deep and help other companies to study thoroughly.

Petri (2009) suggested that,literature should focus on finding out the improvement points in business and help for improvement. Most of the literature are not written with actual example and so that it is not effective to the practitioner.

In this paper, researcher has studied spare part process of one of the automobile company for international business. Researcher has studied the entire process thoroughly & made process flow diagram for simplicity. Researcher contacted concern team member in company to understand the difficulty in east step of process. Companies objective was to reduce the lead time between distributor part requirement to part dispatch which is seen through this process flow diagram. It was found that, there were various concerns in process. As per discussion with team and researcher's 10 years of experience, solutions are made. Further, these solutions implemented by keeping all team member and management in loop. All these impacted significantly on lead time of part requirement to part dispatch. These research paper will real help to the other businesses by understanding the process of international business, difficulties and solutions provided.

The remaining paper is arranged as below. Section 2refers toLiterature review. Section 3focus onresearch methodologyalong with current process, gaps & solutions implemented. Section 4talks aboutresultof lead time reduction. Section 5refers to conclusion, limitation and future scope of the study.

2. Literature Review

Spare parts inventory isrequired for maintenance & repair of end products, automobiles, industrial machines andequipment's. Spare part frequently requires high investments and significantly impacting customer satisfaction. Due to large number of transactions and demand variation, spare part inventorymanagement is complex business.**Jose (2011)**

In current scenario, after sale service has been looked as main key driver for business. It is becoming a key differentiator & profit source for companies **Sergio (2007).**Research in operation and Management science focuses majorly on inventory optimizationissues. In many industry & management issues, spare part is the part of syllabus. Spare part required to maximize the utilization of equipment **Prof. Maurizio Faccio, (2009).**

Inventory planning is the most commonly studied subject in literature. Different kinds of ABC analysis concepts are already available. In addition to this traditional attention points, researcher needs to study other business points also, which help to maximize the business. For example, allocation of authorities and responsibilities, decision making based on qualitative information etc. Inventory management framework to be developed and solve the practical inventory management issues. Framework will help to analyse and redesign the inventory situations. **Leonieke (2003)**.

Rui (2008) suggested the contextual factor study. Researcher need to study in-depth practice of organizations through contingency research. Why organizations are selecting particular operation management practices to be check & framework to be developed.

In his cross-sectional study, Morris A. Cohen (1997) collected precise data on spare part policies, measurement of service parameters, profit and network strategies etc. Heused the same to describe best practice performance.According to research, the companies those have invested in advance inventory management processes, found cost effective service management & leads to success.

Through web-based Delphi study, Christopher (2008) identified 18spare part issues practitioner faced while operating spare part business. Out of that, lack of system and holistic perspective is the top most concern.

According to research, end to end supply chain process analysis & linkages of it through system is very important.

Andrea (2010)& (2012) suggested the five steps to check the status for spare part process attributes. Paulzen(2002), suggested the five stages for quality &process improvement. Process study is important to improve the business parameter. Through proper process analysis, companies will get maximum benefit.

Research gap is seen that, process attributes for spare part business is very important & it need to be study in-depth. There is scope for understanding of spare part operation process step by step.

3.   Research Methodology

Objective ofthis study is to check the operation process of international spare part business & reduce the 'lead time for part requirement to dispatch'in selected organization. Researcher thoroughly studied the current process from part requirement to dispatch.

First, researcher collected the data from various agencies within company i.e. warehouse operation team, buyers, head office back end team, finance, field team, logistic team, system team etc. After data collection, researcher made the process flow diagram. Each step-in process flow diagram discussed with concern team in company and mapped the challenges they faced against it. Based on researcher's 10 years of industrial experience & suggestion from team, researcher mapped the possible solution against the challenges. Solutions are implemented & result has checked.

3.1   Company profile

Industry:Automobile.

Vehicle type: 2-wheeler.

Number of countries involved in spare part business: 60

Number of distributors place an order: 120

Number of spare part warehouse: 1

Number of spare part head office– 1

Distance between warehouse and head office – 300 km.

Current international spare part business: INR 1000 Cr / annum

Number of orders receive in year: 14400

Number of order lines receive in year: 1728000

Number of parts ordered in year: 21000

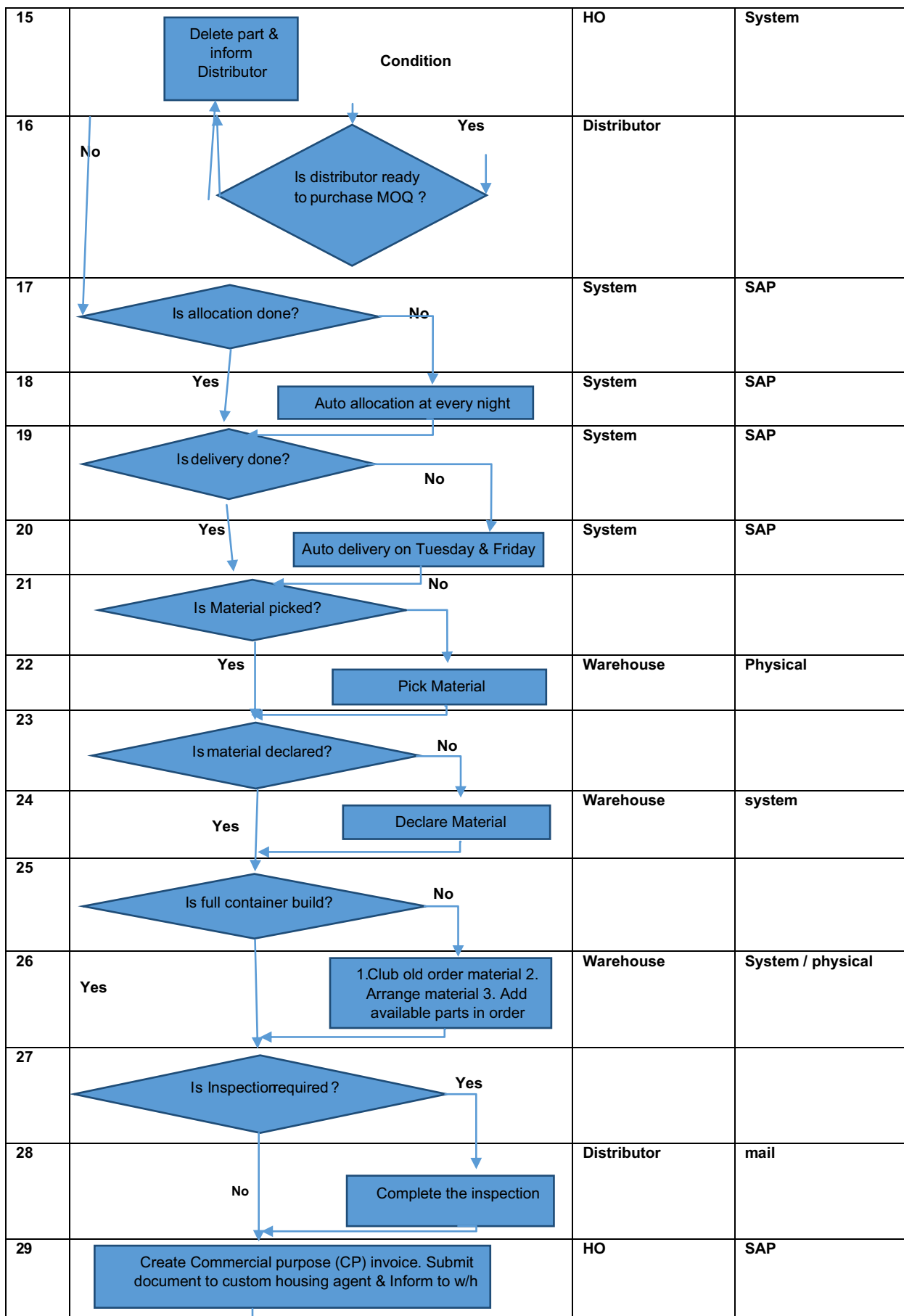Volume: Very high

3.2   Current Process

•   Broader levelprocess of spare part requirement to dispatch

1.   Order creation – Step 1 to 11

2.   Procurement of material – Step 12 to 16

3.   Warehouse material readiness for dispatch – Step 17 to 23

4.   Material dispatch from warehouse– Step 24- 33

5.   Documentation &Measurement – Step 34 -37

- Step by step process of part requirement to dispatch (Before improvement made). Table 1

Step	Process Flow Diagram	Responsibility	Mail / System
1	Spare Part Requirement	Distributor	Excel file mail to Head Office (HO)
2	Is alternate part available? — Yes	HO	Head office refer to Alternate ExceMaster file
3	Write current part number — No	HO	
4	Add price details & prepare quotation	HO	Through SAP
5	Is Performa invoice required? — Yes	HO	Head office refer to PI Excel Master file
6	Create Performa Invoice — No	HO	Through SAP
7	Sendquotation & Performa Invoice to distributor	HO	Excel file mail to Distributor
8	Confirmation for order & payment proof	Distributor	Excel file mail to Head Office (HO)
9	Payment confirmation ? — No	Account team	On mail
10	Follow up for payment — Yes	Spares Manager	Call / mail
11	Create order	Ho	SAP
12	Is part available? — No / Yes	System	SAP
13	Is vendor ready to give part? Or part available in other location? — Yes	Buyer	System
14	- Procure from Vendor schedule release on 16th of every month Or Transfer from1. Plant 2. Domestic stock — No	Buyer	

15	Delete part & inform Distributor Condition	HO	System
16	No Yes Is distributor ready to purchase MOQ ?	Distributor	
17	Is allocation done? No	System	SAP
18	Yes Auto allocation at every night	System	SAP
19	Is delivery done? No	System	SAP
20	Yes Auto delivery on Tuesday & Friday No	System	SAP
21	Is Material picked?		
22	Yes Pick Material	Warehouse	Physical
23	Is material declared? No		
24	Yes Declare Material	Warehouse	system
25	Is full container build? No		
26	Yes 1.Club old order material 2. Arrange material 3. Add available parts in order	Warehouse	System / physical
27	Is Inspection required ? Yes		
28	No Complete the inspection	Distributor	mail
29	Create Commercial purpose (CP) invoice. Submit document to custom housing agent & Inform to w/h	HO	SAP

30	Book container & give delivery order (DO) to transporter.	HO	mail
31	Arrange vehicle and ship container to W/H	Transporter	Physical movement
32	Post Good ssue & Good & Sales Tax invoice	Warehouse	system
33	Boxes loading in vehicle & movement to port	Transporter	Physical movement
34	Custom Clearance	Custom housing agent (CHA)	Hardcopy
35	Vessel Loading	Transporter	Physical movement
36	Bill of lading to be sent to Account	Custom housing agent (CHA)	Courier
37	Customer Invoice (CI) to be prepare and dispatch to distributor	Account	System
38	Lead time measurement	Ho	Excel file record

SAP –Company software system i.e. system application process.; Inspection is required for 6 countries as per local government norm.

- **Once again broader level process is as below. (Fig 1)**

Order creation → Procurement → Material readiness → Material dispatch → Documentation & Measurement

3.3   Challenges identified in process &solution implemented (Table 2) is as below. (Fig 1)

Step	Process	Challenges	Solution Implemented	Responsibility
1	Order creation	Distributor need full container for reducing logistic charges, legal charges & documentation. But, at the time of placing requirement, he doesn't know whether container can be built or not.	In one container 36 cases can be packed. Made a program as per part no, box size, standard box quantity etc. It helped to identify the container load-ability at the time of part requirement only.	Warehouse & HO
1 to 11	Order creation	1. Time consuming task. Multiple round of discussion required.2. Person dependent system.3. Human errors.	CDMS developed and implement at distributor. Dist ributor now placing order in CDMS and it will directly flow in SAP.	HO
12 to 16	Procurement	Parts are not available at the time of order receipt.	Monthly forecasting process started.	Buyer
14	Procurement	If order receives after 15th, then next month schedule goes.	Started weekly MRP run (i.e. release of schedule) for extra orders.	Buyer
14	Procurement	While sending export schedule, system considered domestic stock. But buyer is not moving domestic stock to export as domestic current packing need to remove. It is a time -consuming task andit incurred cost. Domestic packing and export packing in different colour.	Made modular packaging where sticker ispasted at the time of dispatch. Till the time, stock will be considered as common stock.	Warehouse.
12 to 16	Procurement	No visibility for some of the not available parts. At some place's vendors are not supporting properly.	1.Weekly meeting started between development team & spares buyer for critical vendors. 2. Started top management review where immediate action to be decided to cater the requirement.	Management

Step	Process	Challenges	Solution Implemented	Responsibility
18	Material readiness	Allocation of material is prioritized for domestic 4 different order types and then to export orders.	Allocation priority changed. Export orders given priority	Warehouse
20	Material readiness	1.If part receives or order receives on Wednesday, then need to wait for delivery till Friday. At night delivery run will happen. Three days will lose as process delay.	Daily delivery runsstarted.	Warehouse
21 & 22	Material readiness	Picker finds system stock vs physical stock mismatch. Then, he searches the material in warehouse. It consumes time. Currently, audit is happening in bits and pieces. Don't have proper inventory process.	1. Started complete inventory audit once in year thoroughly.2. Kept 3 -4 days all activities on hold for inventory audit preparation and audit. Corrected the system and physical stock entirely.	Warehouse
25& 26	Material readiness	1. Container making is not the priority while picking the parts. It checks after packing.	Priority given to Container planning. Clubbing, arranging of material from other warehouse to be looked as consolidation before start of picking of material.	Warehouse
29,36& 37	Material Dispatch	1.Invoicing at HO and then coordination with warehouse is time consuming activity. 2. Packing list & invoice miss -communication issues. 3. Multiple coordination	All documentation started at warehouse.	Warehouse

4.   Result

After implementation of solution there is significant reduction in dispatch lead time. Lead time reduced from 84 days to 36 days. Details of the same given below.

*   **Average lead time for part requirement to dispatch (Table 3)**

Before solution implemented					
	Order creation	Procurement	Material readiness	Material dispatch	Documentation & Measurement	Total
Lead time in days	6	39	10	19	10	84

After solution implemented					
	Order creation	Procurement	Material readiness	Material dispatch	Documentation & Measurement	Total
Lead time in days	3	10	4	9	10	36

*   **Following is the breakup of lead time before implementation of solution and after implementation of solution.**

A.   Order creation:

Before implementation of solution:average 6 days

I)   Distributor sent mail for part requirement to HO with all necessary details. Some countries send order in night and then HO responding in next day – average 1 day.

II)   Alternate part number check, price check, prepare a quotation& then communication to distributor - average 2 days.

III)   Distributor approaches to bank for payment. Payment communication to HO -average 2 days.

IV)   Order creation in SAP - average 1 day.

After implementation of solution: average 3 days

I)   CDMS implemented at distributor. CDMS creates the quotation on current part number with current price. After that, distributor puts order in CDMS once he made the payment. This is real time system and saves time. – average 3 days (2 days for payment)

II)   CDMS also support for container load-ability. Program made in CDMS which shows, how many containers can be dispatch with given order. Distributor makes an amendment in order if full container load is not form.

III)   Also, standard order quantity facility provided in CDMS based on distributor consumption pattern. System itself confirming order quantity to distributor which form container load andsatisfy distributor requirement.

B.   **Procurement:**

Before implementation of solution:average 39 days

I)   Company release a schedule every month on 25th. Order are getting register in system between 26th of last month to 25th of this month. It took average - 18 days for sending schedule to vendor.

II)   Part procurement –average 21 days.

After implementation of solution: average 10 days

I)   Started monthly forecasting depends on last 24 months consumption trend & market inputs. It triggers the requirement much before the order receipt.

II)   As spare part demand is volatile, some parts ordered more than forecast. Weekly schedule sent to vendor for these increased demands. Buyer focused &procured those parts only priority basis. – average 10 days

C.   **Material readiness:**

Before implementation of solution:average 10 days

I)   Allocation of material - average 1 day.

II)   Deliveries of Material - average 2 days.

III)   Material Pick up & pack. Material to be search out if not found - average 6 days.

IV)   Material declaration - average 1 day.

After implementation of solution: average 4 days

I)   Allocation of material - average 1 day.

II)   Daily auto-delivery run started after allocation run. average 1 day.

III)   Yearly audit system started where all inventory checked. Quarterly sample inventory check established. It saves time for search of physical parts. Material Pick up &pack takesaverage 2 days.

IV) System improvement done for material declaration. Linked material declaration with packing of material. Material gets auto-declared at the time of packaging. -real time.

D.   Material dispatch:

Before implementation of solution: average 19 days

I) Container load-ability & transfer / arrangement of material- average 14 days.

II) Packing declaration communication to HO & CP invoice creation - average 2 days.

III) Container booking & vehicle arrangement - average 2 days.

IV) Boxes loading in vehicle & GST invoice creation- average 1 day.

After implementation of solution: average 9 days

I) Container load ability program developed which works before picking of material. Following four types of material considered for container load ability. Delivery made but material yet to pick + material pick but not packed + waiting for container load+ material in other warehouse & in receipt.

II) Transfer / arrangement of material as per program- average 5 days.

III) CP invoice creation activity shifted to warehouse. Communication and dependent delays avoided - average 1 day.

IV) Container booking & vehicle arrangement - 2 days

V) Boxes loading in vehicle & GST invoice creation- 1 days

Note – Now, there are two times container load-ability check. One when dealer finalize his part requirement and places order. Second, when warehouse before pick and pack the material.

5.   Conclusion & suggestion:

Currently, spare part lead time has become an equally important parameter along with spare part sale. Reduction in spare part supply lead time helps in customer satisfaction. Company process shows that, there was very large scope for improvement in lead time. With systematic analysis of entire process & communication with team, researcher found out the solutions for challenges. Once company management and team accepted it, implementation became easy.

In large business, processes need to be simplified. Tracking of each process is an important step. It helps to understand the issue. IT team plays a crucial role to solve these issues.With this, proper planning for procurement and planning for material packing are very important activities. Focus on these 3 activities helped a lot to reduce the lead time.

This journal will help to other businesses who are in international supply chain activity. It will help to understand the systematic way of lead time reduction through process analysis. It will also help to new entrant in international business. They will have refined process ofspare part international business.

Limitations and future scope: Future research can be focused on further decrease in lead time. Forecasting method refinement is purely one area which will further help on part availability. It is a separate and special topic which is not part of this paper.

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