A STUDY ON APPLICATION OF KNOWLEDGE MANAGEMENT IN THE SUPPLY CHAIN OF AUTO COMPONENT INDUSTRY IN INDIA

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Abstract

The business environment in Indian auto component industry is characterized by rapid changes in technology level, management practices, customer preferences, manpower that have made them to rethink their strategy to survive and grow in the highly competitive market. In this environment, knowledge management becomes the backbone for supply chain management. To achieve the results of knowledge sharing, the organizations and their suppliers should adapt to current conditions and prepare for changes in future. This study was aimed at understanding the status of knowledge management in supply chain in auto component industry in India. The study was descriptive in nature and involved a case study also. The population included parties in supply chain of Auto component industry in India. The primary data were collected through a questionnaire from a sample of 41 collected using systematic sampling. An analysis of the Maruti Ugyog Ltd., using Situation-Actor-Process (SAP) model also was conducted. It was identified that Majority of them benefitted by application of new tools of supply chain management and the knowledge management strategy helped them to support the core competency for providing customer services at an affordable cost. An analysis was also conducted to identify the strengths of Maruti Ugyog Ltd.

Key words : Auto Component Industry, Delivery Instruction System (DI), Knowledge Management (KM), Situation-Actor-Process (SAP) model, Supply Chain Management (SCM)

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1. INTRODUCTION

The last decade has seen the most significant changes in the Indian automobile and auto component industry. The revolution that started since 1983, this sector of the economy has seen profound changes in terms of growth, technology, quality and joint ventures. Prompted by the liberalization and globalization started by the Indian government in 1991, majority of the global auto and auto component majors have established their bases in the India. The changes in the environment characterized by rapid changes in technology level, changes in management practices, changes in customer preferences, rapid changes in manpower, fierce competition have made the Indian firms to rethink their strategy in order to survive and grow in the highly competitive market space. In this environment, Knowledge management is becoming the backbone for any management practices and is very vital for Supply chain management in auto industry. There are some changes in the business environment that supply management organization and their suppliers should adapt to and prepare for as the supply chain becomes more knowledge management based.

A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers but also transporters, warehouses, retailers and customers themselves. It integrates suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements. The objective of every supply chain is to maximize the overall value generated. The value a supply chain generates is the difference between what the final product is worth to the customers and the effort the supply chain expends in filling the customer's request.

There are two perspectives a supply chain may take. An internal supply chain links all the functions that work together to fill a customer's order. An external supply chain is defined as a group of independent organizations working together in a specific channel to deliver a product or service. Supply Chain Management is an integrated process that begins with planning the acquisition of customer-driven requirements for material and services and ends with the delivery of material to the operational customer, including the material returns segment of the process and the flow of required information in both directions among suppliers, logistics managers, and customers. Management of the supply chain also entails a fully coordinated set of related process cycles; including planning, procurement, repair, and delivery, that are collectively optimized to

ensure that materiel and service requirements are efficiently planned for and executed to the satisfaction of the customer. Supply Chain Management focuses principally on satisfying customer requirements and secondarily on meeting these requirements at the lowest total process cost.

In supply chain organization, information flow is an intangible part of the supply chain; its presence is a major factor in adding value to the supply Management organization and its suppliers. Without an efficient knowledge management model in place, information that is critical to current, ongoing, and future success of the supply chain may be jeopardized. In short, knowledge management is retrieving the right information, for the right people, at the right time.

To grasp the complexity of the supply chain, the following areas are to be looked at:

- Defining information and knowledge: how do supply managers differentiate between the two concepts
- The role of information technology: how can supply management organization use existing information technology systems for knowledge management
- Moving forward into knowledge management: what supply management process enables knowledge management to exist
- Promoting knowledge management: how can supply managers can promote knowledge sharing within the organization and externally with the suppliers
- Finding and packaging knowledge: where do supply managers find knowledge and how do they package it for the appropriate person or department
- Maintaining information integrity in the supply chain: how can supply managers ensure that the integrity of information is maintained throughout the information supply chain

Without information, no supply chain would be able to function successfully or competitively. Supply management organizations would be operating independently and internal departments would be working in sites. There would be little feedback on whether the organization was meeting the needs of its customers. Thus, the information supply chain is critical to the success of supply management organizations and their suppliers. Within this supply chain, the type of information exchanged and its usage can be a deciding factor in how strategic an organization an organization becomes in the market place. Unless information is accessed or shared and then used by supply managers, there is little chance that any competitive advantage will be realized.

To achieve the most desired outcome for knowledge sharing, it's important for supply management organizations and their suppliers to adapt to current conditions and prepare for inevitable changes in the new future. The knowledge – harvesting process promotes accurate, up-to-date information, which makes it possible for the organization to build a trusting, information sharing culture with its suppliers.

Trust is the key factor in knowledge creation. Without trusting collaborative supply manager/ supplier relationship, it would be nearly impossible to succeed in Knowledge creation phase of the supply chain.

There are some changes in the business environment that supply management organization and their suppliers should adapt to and prepare for as the supply chain becomes more knowledge management based:

- The need for supply management to tap into the wealth of expertise located around the world. Supply managers must be empowered to search globally for expert knowledge about their industry.
- Growth of strategic alliances and joint ventures: More and more, the knowledge that is needed to be successful is not located within one's organizational boundaries. Therefore, it requires that more attention to be paid to how it's exchanged and leveraged.
- Migration from products to services: As firms are looking to differentiate their products in a competitive environment, they are leveraging knowledge to create value – added products and services on top of them.
- Product complexity: As firms try to differentiate their products by adding more features, there is more to know about selling, distributing, servicing and repairing these items. That is why it is imperative that supplies management organization and their suppliers build strategic alliances and joint ventures in order to share knowledge about the inner workings of products and services.
- Maintaining Information Integrity in the supply chain: By recognizing and adapting to change, supply managers are setting themselves on the right path for implementing knowledge management into their organizations and supply chains. As supply managers would expect, there are constraints when suggesting further decision-making process that stretch beyond an organization's KM system. However overcoming these constraints maintains the integrity of knowledge shared throughout the information supply chain.

- Supply Manager Enabler: From a more individual perspective, supply managers themselves can lead their organization in the behavior necessary to implement a successful KM model. IBM institute for KM based organization provides the following characteristic inherent in supply chain organization with successful KM models. These characteristics will also aid the supply management department in overcoming the constraints often experienced when implementing management model into the information supply chain.
- Awareness of the knowledge and skills of others: Supply managers need to know who knows what within the supply management and supplier organizations.
- Time and space to create, share and apply knowledge: Supply managers must be able to respond to other employees' and suppliers' questions. Investigate new ideas, understand how new situation can be applied to another, and train and mentor junior employees. Time is the most constraining resource with regard to sharing knowledge. As supply chain managers encounter new solutions and technique, these ideas must be shared with the organization and supplier
- Trust: This element must exist between the knowledge seeker and the knowledge source. Research has shown that without a level of trust between those sharing for knowledge and those who have it, effective knowledge sharing does not occur. Supply managers have to feel comfortable that the knowledge they share will not be misunderstood.
- Common language and understanding: Without common agreement on vocabulary and background context, it is difficult to apply knowledge from one part of the organization to another.

2. NEED FOR THE STUDY

To achieve the most desired outcome for knowledge sharing, it is important for supply management organizations and their suppliers to adapt to current conditions and prepare for inevitable changes in the new future. The Knowledge harvesting process promotes accurate, up-to-date information, which makes it possible for the organization to build a trusting, information sharing culture with its suppliers. Trust is a valuable component that is necessary for supply management organization to focus on knowledge creation process. Without trusting collaborative supply manager/ supplier relationship, it would be nearly impossible to succeed in Knowledge creation phase of the supply chain. In this background, an attempt has been made to understand

and assess the status of use of knowledge management in supply chain in auto component industry in India.

3. OBJECTIVES

- To study the supply chain of the auto component industry in India to understand the problems pertaining in relation to knowledge sharing.
- To study the application of knowledge Management in the supply chain of auto component industry in India.
- To improve the supply chain management of auto component industry by the application of Knowledge Management.

This project looks into the use of knowledge management (KM) in supply chain in automobile company and its effect on auto component manufacturing industry and the steps taken to improve upon the supply chain components.

4. RESEARCH METHODOLOGY

The study was descriptive in nature. The later part of the study was a case study. The population included all parties in supply chain of Auto component industry in India. The study was done by collecting primary and secondary data pertaining to the organization. The primary data were collected through a questionnaire. This was carried out by distributing questionnaires to the decision makers in different organizations in the supply chain of the auto component industry in India. The sources of secondary data were the publications of the collection of the data regarding past and present performance. This included industrial survey reports published by the eminent newspapers and company annual reports. The sample size was 41. A pilot study was made using data collected from 7 respondents and the value of Chronbach Alpha was calculated to be 7.899. The value of Chronbach Alpha showed that the questionnaire was reliable. The sampling method used was systematic sampling. Percentages were used for the analysis of data from the questionnaire survey. For further analysis of the Maruti Ugyog Ltd., Situation-Actor-Process (SAP) analysis was used. The SAP analysis was used to learn about the supply chain management in Indian auto component industry.

Selection of the organization for the purpose of case study was a difficult task. The criteria considered were technology domain in which the firm is operating, accessibility to information

regarding technology management practices, product profile and the past performance of the firm and location of the firm

The limitations include the lower accessibility to information regarding technology management practices as this type of information is not available in public domain, the bias and assumptions with the respondents and the limited availability of resources like time and fund.

5. ANALYSIS

The data analysis was done in two stages. In the first stage, the data collected through survey was analyzed and in the second stage the case study was conducted.

5.1 Analysis of data from survey

Analysis was done on the level of adoption of the strategies of supply chain management among the organizations. The results are shown on Table No. 1.

Table No. 1: Level of adoption of strategies

Strategy to be adopted	Improves Supply chain (%)	Start Implementing now (%)	Satisfied already (%)	Not appropriate (%)
Close partnership with Suppliers	4.5	1.6	3.6	6.9
Close partnership with Customers	12.9	9.8	17.3	13.4
JIT supply	6.8	6	6.7	3.2
e-procurement	18.1	17.5	18.6	16.2
Outsourcing	1.1	3.8	4	6
Subcontracting	8.5	9.2	4	5.1
Plan Strategically	20	16.9	19.1	25.5
Supply Chain Benchmarking	1.7	0.01	0.4	3.2
Vertical Integration	13	9.8	11.2	2
Few Suppliers	0.3	1.6	1.3	3.2
Many suppliers	0.3	6.5	0.9	6
Holding safety stock	6	8.1	9.8	7.9
Use of external consultants	6.8	9.2	3.1	1.4

Source: Primary data

- For improving the supply chain, majority of the respondents suggested improving the planning strategy, e-procurement, close partnership with customers and vertical integration.
- In order to manage supply chain sector better, majority of the respondents suggested to start implementing e-procurement, planning strategy, close partnership with customers and vertical integration. Some had suggested starting implementing use of external consultants and safety stock.
- Majority were already satisfied with their planning strategy, e-procurement, close partnership with customers, vertical integration and holding their safety stock.
- Some respondents suggest that it is inappropriate to have external consultants, vertical integration, and supply chain bench marking.

Analysis was done on the opinions among the organizations on the systems to implement in near future. The results are shown on Table No. 2.

Table No. 2: System to implement in the near future

	Custom made (%)	Standard package (%)	Not going to implement (%)
Materials Requirements Planning	37.5	6.25	56.25
Manufacturing Resources Planning	31.25	6.25	62.5
Enterprise Resource Planning	25	12.5	62.5
Warehouse Management System	25	12.5	62.5
Supply Chain Management	56.25	12.5	31.25
Customer Relationship Management	50	31.25	18.75
Supplier relationship Management	43.75	12.5	31.25
Advanced Planning System	6.25	12.5	81.25
Just In Time	37.5	12.5	50
Theory of Constraints	0	0	100
E- commerce	25	0	75
E-business	6.25	6.25	87.5
Decision support / expert system	6.25	6.25	87.5
Radio frequency Identification	18.75	18.75	62.5
Electronic Data Interchange	25	12.5	62.5
Bar Coding	18.75	6.25	75

Source: Primary data

- Materials Requirement Planning: Some companies responded that they are going to implement custom made package, a small number of companies expressed that it is planning to implement

standard package and majority of the companies have responded that they are not going to implement the MRP package.

- Manufacturing Resources Planning (MRP II): Some companies responded that they are planning to implement custom made package, a small set of companies expressed that it is planning to implement standard package in the next two years period. Majority of the companies responded that they are not going to implement MRP II Package.
- Enterprise Resources Planning (ERP): Some companies responded that they are planning to implement custom made package, some companies expressed that they are planning to implement standard package. Majority of companies responded that they are not going to implement ERP package Information.
- Warehouse Management System: Some companies responded that they are planning to implement custom made package, some companies expressed that they are planning to implement standard package. Majority of companies responded that they are not going to implement ERP package.
- Supply Chain Management: Majority of companies responded that they are planning to implement custom made package, some companies expressed that they are planning to implement standard package. Some companies responded that they are not going to implement SCM package.
- Customer Relationship Management: Majority of companies responded that they are planning to implement custom made package, some companies expressed that they are planning to implement standard package. Some companies responded that they are not going to implement CRM package. Eighteen companies responded that they are planning to implement custom made package, some companies expressed that they are planning to implement standard package. Majority of companies responded that they are not going to implement SRM package.
- Advanced Planning Systems: A small set of companies responded that it is planning to implement custom made package, a small set of companies expressed that they are planning to implement standard package. Majority of companies responded that they are not going to implement APS package.

- Just-In-Time: Some companies responded that they are planning to implement custom made package, a small set of companies expressed that they are planning to implement standard package. Majority of companies responded that they are not going to implement JIT package.
- Theory of Constraints: All the companies responded that they are not going to implement TOC package.
- E-Commerce: Some companies responded that they are planning to implement custom made package and remaining Majority of companies responded that they are not going to implement E-commerce package.
- E-Business: A small set of companies responded that it is planning to implement custom made package, another small set of companies expressed that it is planning to implement standard package. Majority of companies responded that they are not going to implement E-Business package.
- Decision Support Systems: A small set of companies responded that it is planning to implement custom made package, another small set of companies expressed that it is planning to implement standard package. Thirty five companies responded that they are not going to implement DSS package.
- Radio Frequency Identification: Some companies responded that they are planning to implement custom made package, some companies expressed that they are planning to implement standard package. Majority of companies responded that they are not going to implement RFID package.
- Electronic Data Interchange: Some companies responded that they are planning to implement custom made package, a small set of companies expressed that they are planning to implement standard package. Majority of companies responded that they are not going to implement JIT package.
- Bar coding Technology: Some companies responded that they are planning to implement custom made package, a small set of companies expressed that it is planning to implement standard package. Majority of companies responded that they are not going to implement bar coding package.

5.2 Case of Maruti Udyog Limited: Knowledge Management in Maruti Udyog Limited

Maruti Udyog Limited (MUL) has a definite leadership in the area of information management. MUL has begun this journey by creating a "seed team" under the aegis of Supply chain division.

This team has the responsibility to generating a "critical mass" for knowledge related awareness amongst the people. The IT division has taken a mantle of infrastructure provisions. Through various consultations, and technology scanning a suitable platform, which can gel together with the existing legacy systems, in-house ERP, groupware, etc. has been selected. The "seed team" working on implementing the Supply chain initiatives comprises of, also called the Information Management Team: Primary member (Supply Chain Division), Division member (IT Division) and Functional areas (Production, Marketing, Service, Supply chain). Maruti has taken a lot of initiatives to improve the process and delivery mechanism of raw material of the factory and finished cars to our final customers in order to achieve customer satisfaction in this present competitive scenario.

Similar initiatives have been taken in Supply Chain Procurement system for better and effective inbound logistics services. Following are the initiatives taken in Procurement system commonly known as Delivery Instruction System (DI).

- Information flow through Extranet
- e-Procurement
- Milk-van scheme for local vendors
- Systematic VA/VE & Cost reduction efforts
- Local Warehousing of Distant Vendors for Cost and Logistics advantage
- Vendor Up gradation activities
- Direct Clearance of Incoming parts

Objectives with which DI system has been implemented can be summarized as below:

- To achieve average inventory at one day level for Indigenized parts which are coming within our country
- Continuity in production with no stoppages of line in various shops
- To save on multiple materials handling in order to improve effectiveness of the materials, smooth running of line, quality related issues arising from mishandling etc.
- Physical control of stocks
- To reduce follow up
- Reduction in waiting and unloading time
- To meet market requirement effectively

- To help MUL in becoming a lean organization

The case based methodology covered the following attributes of the firm:

- Procurement of raw material - Ordering System
- Nature of information flow of the requirements.
- Interpretation of the information by the supplier (ASAHI GLASS)
- Inventory control at MUL.
- Linkage of inventory control with production plan
- Adjustment of Production plan as per marker demands
- Accuracy of the production plan forecasting.
- Understanding of the problem faced in Inventory control
- Intangible information of the problem converted into tangible form
- Education to the supplier for fast and flexible manufacturing plans at their end.
- Manufacturing plan of the supplier in tune with MUL requirement.

5.3 SAP-LAP Analysis

The S-A-P analysis was used to learn about the Supply chain management in Indian Auto Component Industry with Knowledge Management Application. In each case,

- The Context of the situation has been identified.
- The current Situation of the organization and the operating environment have been studied.
- The roles played by various people and parties involved (Actors) have been described.
- The Process part deals with the practices and strategies being adopted by the firm.

These steps are discussed in detail here.

- Context: Use of Knowledge Management in Supply Chain
- Situation: Incoming of big players in Indian automobile industry. MUL market share has gone down from 82% to 54%. A lot of options with in very small price range variation are available leading to throat cutting competition. Prices of all raw materials are going up but, MUL is forced to lower the prices of its vehicles. In anticipation of stiff competition, investments in R&D have been hiked.
- Main Actors: MD of MUL, SUZUKI Motor Corporation, CEO of Asahi Glass Ltd., Customers as opportunity providers, Competitors as source of inspiration, Employees and management head of both organizations

- Processes: Set up of project managers for procurement and allocation of roles and responsibilities, Re-structuring and re-designing of IT set up, Training to responsible employees at MUL and at Vendor end, Selection of Inventory control package and implementation in both the organizations, The phased implementation approach.

  Learning Issues: The activities were divided in to three categories. The categories are shown in Table No. 3

Table No. 3: Normal, Important and Critical activities

Normal	Important	Critical
Benchmarking of Inventory control system at MUL with industry standards. Customization of Inventory package. Process of transfer of competencies.	Periodic review of middle management and key users commitment. Positive attitude. Teething problem to be eliminated by cross functional team. Recognition and reward to concern. Presence of strong IT division	Strong review by top management. Retention of team members Continuous training of responsible persons Sharing of information with supplier.

Source: Primary data

Action

- Training of the key persons of both MUL and ASAHI GLASS in order to make cultural change in inventory control management
- Opening of extra net for proper and accurate informational flow
- Strong IT for processing of manufacturing and market demand data
- Doing KAIZEN for small teething problems
- Making infra structural changes for proper implementation of direct online (DOL)

Performance

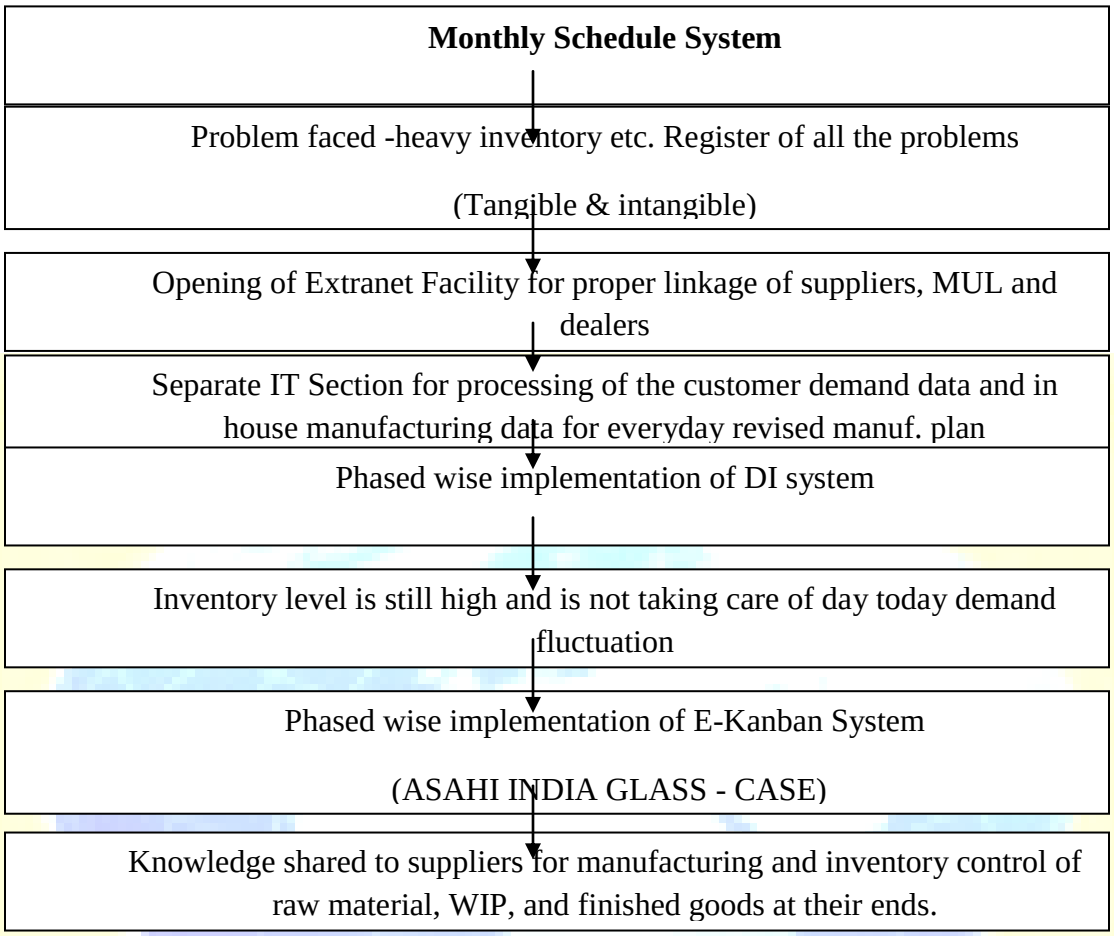
- Comparative measurement of inventory level of earlier situation and new situation
- Measurement of reduction of Inventory level of 'A' and 'B' class material
- Measurement of inventory gap between computer data and physical counting
- How fast minor adjustments in procurements can be made depending upon market situation.

6. FINDINGS

- The companies feel that for improving the planning strategy, e-procurement, close partnership with customers and vertical integration are good strategies for improving the supply chain performance.
- The companies feel that they need to start implementing e-procurement, planning strategy, close partnership with customers, vertical integration, external consultants and holding safety stock.
- The companies who have already implemented are satisfied with their planning strategy, e-procurement, close partnership with customers, vertical integration and holding their safety stock.
- Some companies feel that it is appropriate to use of external consultants, vertical integration and supply chain bench marking.
- Majority of them enjoyed benefiting greatly by application of Materials Requirement Planning, Manufacturing Resources Planning (MRP II), Enterprise Resources Planning (ERP), Warehouse Management System, Supply Chain Management, Customer Relationship Management, Advanced Planning Systems, Just-In-Time, Theory of Constraints, E-Commerce, E-Business, Decision Support Systems, Radio Frequency Identification, Electronic Data Interchange and Bar coding Technology

Through the case study various phase wise improvements keeping previous system knowledge and incorporating market demand fluctuations. It can be understood from Figure No.1 given below.

Figure No. 1: The process of updating knowledge



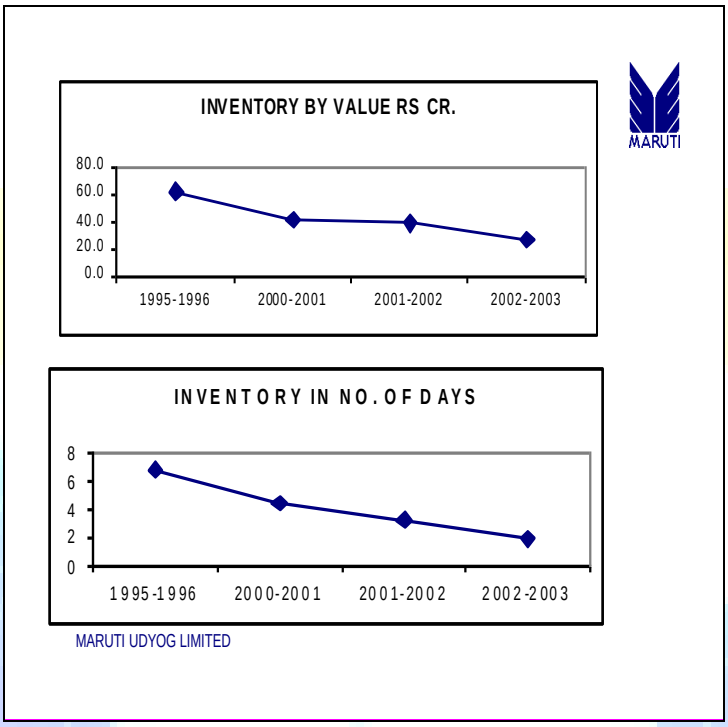
Source: Company records

Major Strength and Actions taken by MUL are the following.

- Strong, reliable vendor base
- Long term contracts / relationships
- Emphasis on long term planning
- World class scheduling system
- Dedicated and cost effective transport system
- Supplies match consumption
- Material direct to usage point, minimum handling
- Most components in direct clearance
- Reusable trolleys and bins
- Average inventory: 1.8 days

This has given a lot of benefits to MUL and can be understood easily by the Figure No. 2 for Inventory savings in terms of money and days.

Figure No. 2: The inventory data over the years



Source: Company records

7. SUGGESTIONS

There were some suggestions provided based on the findings of the study.

- The companies need to start implementing e-procurement, planning strategy, close partnership with customers, vertical integration, external consultants and holding safety stock.
- There are many tools available for improving the supply chain performance viz., Materials Requirement Planning, Manufacturing Resources Planning (MRP II), Enterprise Resources Planning (ERP), Warehouse Management System, Supply Chain Management, Customer Relationship Management, Advanced Planning Systems, Just-In-Time, Theory of Constraints, E-Commerce, E-Business, Decision Support Systems, Radio Frequency Identification, Electronic Data Interchange and Bar coding Technology. The companies need to implement them.
- The application of KM must accelerate cost competitiveness in vehicle manufacturing, delivery and customer servicing. It needs to develop close circuit B2B exchange for integrating the

supply and distribution chain to cut the cost of transaction of supply and delivery to gain cost competitiveness of operational processes. The recommended strategies are:

- Knowledge management strategy must support it core competency of providing best technology and customer services at an affordable cost.
- Connect the activity heads and their operators with the receivers of the work by deploying a shareware across the value chain of the organization.
- Apply the expertise, resources and recent market experience to develop a broad band Virtual marketing channel for rural and urban customers.
- Use updated technology to integrate the tradition business processes for all the activities of value chain to enhance operational efficiency.
- Deploy Intranet and the GroupWare for harmonious integration of working across the global offices.

8. CONCLUSION

The success of business is accomplished not by copying rival's business strategy but by careful tailoring of the knowledge management applications to company's overall business strategy in a way that extends its competitive advantage and make them more sustainable. Knowledge management strategies need to be the different for the companies to achieve this. This study was aimed at improving the supply chains of automobile sector in India through application of knowledge management. The survey and the case study provided insights in to the issues and some suggestions were made.

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