International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-2, Issue-9, September 2016
ISSN: 2395-3470
www.ijseas.com

Investigation on Supply Chain Activities in Indian Manufacturing firms

B.Jeergi.Arunkumar[1], S.S.Hebbal[2]
[1]Reasearch Scholar, Rayalseema University, Kurnool AP, India,
[2]Department of Industrial Production Engineering, P.D.A. Engineering College, Gulbarga India

Abstract
Supply Chain Management emerged as one of the most powerful business improvement tool available today. A number of SCM practices such as supplier, customer, ERP, subcontracting, E-procurement, EDI, E-commerce have been addressed in Indian manufacturing industries and a conceptual model was formulated based on previous literature and a questionnaire developed, survey was performed. This paper examines the effect of Supply Chain Management Strategies and its information system packages that are following in various manufacturing industries. Primary Data from manufacturing industry of various fields like Automotive, Sugar, Cement, Steel etc…were collected through interview and mail survey. The content of reply and reliability are tested. Analysis has been carried out based upon questionnaire results and suitable hypothesis developed. The survey and analysis proves that the Supply Chain Management Strategies and custom-made packages are significantly useful to the manufacturing firms.
Keywords—*Supply chain strategies, questionnaire, custom-made packages, ready-made packages, lead time, delayed orders.*

1. Introduction

Supply chain management (SCM) is a concept involving the integration of all the value-creating elements in the supply, manufacturing, and distribution processes, from raw material extraction, through the transformation process, to end user consumption.
Supply chain management is an integrated approach beginning with planning and control of materials, logistics, services, and information stream from suppliers to manufacturers or service providers to the end client; it represents a most important change in business management practices [5]. It is one of the most effective ways for firms to improve their performance [9].
A successful SCM implementation is expected to enhance the relationship between upstream suppliers and downstream customers, and thereby increase customer satisfaction and firm performance. Prior research has indicated SCM as a key driver of firm performance [11].
This paper examines the supply chain management practices / strategies and adoption of IT packages adopted by the companies to manage their supply chain. Various methods and strategies are available to manage the supply chain. Some important strategies for managing the supply chain which are considered for our survey are: Partnership with Suppliers, Partnership with Customers, Just in time Supply, E-Procurement, Electronic Data Interchange, Subcontracting, Vertical Integration, Few Suppliers, Many Suppliers, Holding Safety Stock, and Use of External Consultants.
Various IT packages (role of IT) are available to manage the supply chain. Some important IT packages for managing the supply chain which are considered for our survey are: Use of Material Requirements Planning, Manufacturing Resources Planning, Enterprise Resource Planning, Warehouse management system, Supplier relations management system, advanced planning system, just in time, E-commerce, Decision support system-commerce, Electronic Data Interchange (EDI), Bar Coding (Scanner) & Radio Frequency Identification (RFID).
The purpose of this paper is to explore the SCM activities carried out by manufacturing firms in India. A survey methodology was carried out to identify the status of SCM in Indian manufacturing firms and determine the issues in SCM that are significant for Indian manufacturers.
Traditional manufacturing practices can no longer secure competitive advantage in the war of supply chain. Since mass production alone cannot provide the speed and today's customers require, it is time to use new manufacturing strategies in the firms to achieve the goal.
Face-to-face management, manual tracking systems, paper-dominated order processing systems, and wired communication links were the primary management tools available to purchasing managers and organization. Availability of skilled man power is seriously falling short in manufacturing industries. Communication and information sharing

within the organization was difficult in above mentioned activities hence the focus is on to study and analyze how these SCM strategies or IT tools and are bringing change in SCM adopted manufacturing industries.

1.1 Effect of Information Technology on Supply Chain Management

Information technology (IT) consists of a collection of IT resources that are shared and used by a firm. It consists of both the technical and organizational capabilities that provide the opportunities to share IT resources within and across the firm. Information sharing is the ability of the firm in sharing knowledge with supply chain partners in an effective and efficient approach Effective information sharing is considered as one of the most important abilities of supply chain process. Information sharing is one of the most important tools for achieving an integrated and coordinated supply chain.

The benefits of Information technology tools and information system packages in SCM are not well practically shown by many researchers. The non SCM following industries are unaware of benefits of SCM. What type of information technology tools and information system packages are following in various industries, all these factors are not known by many Indian industries.
The main objective of the proposed work is to highlight the differences in performance between industries adopting SCM practices and industries who are not employing SCM practices regularly and to achieve suitable findings which relate to the SCM strategies / practices and to exploit the capabilities of IT and its tools for SCM and also to identify the issues related to information sharing as the most critical factor of supply chain activities with the use of IT tools.

2. Target industries for survey

A survey questionnaire approach was adopted to collect data. The questions on the questionnaire where gathered from the review of literature. The data of this research were collected by using an electronic (online) Survey distributed to Eight sectors from the Indian manufacturing industry were selected for the administration of the questionnaire. These are: (i) Automotive (ii) Cement (iii) Electronic parts manufacturing (iv) Steel (v) Sugar (vi) Tool/ machinery parts (vii) Textile (viii) Pharmaceutical.

HKE Society's Poojya Doddappa Appa College of Engineering was established in the year 1958 in Gulbarga District. Karnataka State.PDA College of Engineering, Gulbarga has large number alumni nearly 20000 students of this Engineering College have been completed engineering in various branches and have spreaded all over the world. About 20% of the total alumni are in key positions in various companies.400 chosen names of logistics managers in 400 companies were delivered from PDA College of Engineering data base.

The respondents were mainly members of the companies and had a management position that was concerned with logistics. The quantitative research data was gathered with the aid of online survey. The empirical foundation for the survey study is a questionnaire. The questionnaire and the cover letter were mailed to the 500 logistics managers. After two weeks, randomly chosen respondents were phoned and reminded about the questionnaire. If they did not answer the phone call, the respondent was later e-mailed and reminded about the survey. The purpose of the phone call was to increase the response rate, but also to investigate why the respondent had not answered the questionnaire

A total of (400) questionnaire was distributed; Two hundred (200) responses were received. Of that number (200), one hundred and Eighty (180) were usable for analysis, but twenty (20) responses were unusable. Thus the gross response rate of research survey was 50% (200/400) of which, 180 returns, 45% (180/400) were suitable for analysis as shown in Table 1.

Table 1: Responses to survey questionnaire

Total number of questionnaire	400
Total number of questionnaire	200
Total number of returns useful for	180
Total number of returns un useful for	20
Gross response rate	50%
Usable response rate	45%

Table 2: Response proportions industry wise

Cement	**Electronic Parts Mfg**	**Sugar**	**Steel**	**Automotive**	**Textile**	**Tool/Machinary**	**Pharmaceutic**

							al
22	23	22	25	23	21	22	22

The sample size for the present study is One hundred and eighty organizations. Organizations from core infrastructure industries such as Automotive, Cement, Electronic parts manufacturing, Steel, Sugar, Tool/machinery parts, Textile and Pharmaceutical have been chosen as in table II. The sample is a blend of large scale and medium and small scale companies. The composition of the sample includes Government and Private sector undertakings. The sample companies have been selected on various metrics such as variety of sectors/industries, turnover, number of employees. Stratified sampling method is used to select the sample. These fifteen companies were grouped into three groups based on the product category.

The present study is based on both primary as well as secondary data. A structured questionnaire has been canvassed to the managers of companies. The additional required information has been gathered through extensive interface and formal and informal interactions with various people associated with supply chain management. Primary data has been supplemented by secondary sources of information available from records, brochures, annual reports and other publications wherever required.

3. IT packages considered for the survey

3.1 Electronic Data Interchange

Electronic Data Interchange (EDI) refers to computer-to-computer exchange of business documents in a standard format. EDI describe both the capability and practice of communicating information between two organizations electronically instead of traditional form of mail, courier, & fax. The benefits of EDI are Quick process to information, Better customer service, Reduced paper work, Increased productivity, Improved tracing and expediting, Cost efficiency, Competitive advantage and Improved billing.

Though the use of EDI supply chain partners can overcome the distortions and exaggeration in supply and demand information by improving technologies to facilitate real time sharing of actual demand and supply information.

EDI is also independent of users' internal computerized application systems, since it interfaces with those systems rather than being integrated into them. However, the degree of effectiveness of the EDI operation itself, as well as the internal management information available from its use, will certainly be greater if application systems are up-to-date and efficient.

3.2 Electronic Commerce

It is the term used to describe the wide range of tools and techniques utilized to conduct business in a paperless environment. Electronic commerce therefore includes electronic data interchange, e-mail, electronic fund transfers, electronic publishing, image processing, electronic bulletin boards, shared databases and magnetic/optical data capture. Companies are able to automate the process of moving documents electronically between suppliers and customers.

3.3 Material Requirement Planning (MRP)

The main theme of MRP is "getting the right materials to the right place at the right time". Material Requirements Planning is a time phased priority-planning technique that calculates material requirements and schedules supply to meet demand across all products and parts in one or more plants.

Information Technology plays a major role in designing and implementing Material Requirements Planning systems and processes as it provides information about manufacturing needs (linked with customer demand) as well as information about inventory levels. MRP techniques focus on optimizing inventory. MRP techniques are used to explode bills of material, to calculate net material requirements and plan future production.

The globalization of the economy and the liberalization of the trade markets have formulated new conditions in the market place which are characterized by instability and intensive competition in the business environment. Competition is continuously increasing with respect to price, quality and selection, service and promptness of delivery. Removal of barriers, international cooperation, technological innovations cause competition to intensify. In terms of manufacturing emphasis is placed on reducing cost while improving quality.

3.4 Manufacturing Resource Planning (MRP II)

Manufacturing resource planning, also known as MRP II is a method for the effective planning of a manufacturer's resources. MRP II is composed of several linked functions, such as business planning, sales and operations planning, capacity

requirements planning, and all related support systems. The output from these MRP II functions can be integrated into financial reports, such as the business plan, purchase commitment report, shipping budget, and inventory projections. It has the capability of specifically addressing operational planning and financial planning, and has simulation capability that allows its users to conduct sensitivity analyses (answering "what if" questions).
The earliest form of manufacturing resource planning was known as material requirements planning (MRP). This system was vastly improved upon until it no longer resembled the original version. The newer version was so fundamentally different from MRP, that a new term seemed appropriate. Oliver Wight coined the acronym MRP II for manufacturing resource planning. In order to best understand MRP II, one must have a basic understanding of MRP, so we will begin with a look at MRP and then expand into MRP II.

3.5 Enterprise Resource Planning (ERP)

Enterprise Resource Planning & Supply Chain Management is a formal method to effectively plan all the resources in the business enterprise. Through the implementation of Enterprise Resource Planning & Supply Chain Management manufacturing companies establish operating systems and operating performance measurements to enable them to manage business operations and meet business and financial objectives.
Enterprise resource planning (ERP) systems integrate internal and external management information across an entire organization, embracing finance/accounting, manufacturing, sales and service, customer relationship management, etc. ERP systems automate this activity with an integrated software application. The purpose of ERP is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders.

3.6 Ware House Management System (WMS)

A warehouse management system, or WMS, is a key part of the supply chain and primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, put away and picking. The systems also direct and optimize stock put away based on real-time information about the status of bin utilization.

The objective of a warehouse management system is to provide a set of computerized procedures to handle the receipt of stock and returns into a warehouse facility, model and manage the logical representation of the physical storage facilities (e.g. racking etc.), manage the stock within the facility and enable a seamless link to order processing and logistics management in order to pick, pack and ship product out of the facility. Warehouse management systems can be stand alone systems or modules of an ERP system or supply chain execution suite.

3.7 Advance Planning System (APS)

It is well-known that the strength of transactional enterprise resource planning (ERP) systems is not in the area of planning. Hence, APS have been developed to fill this gap. APS are based on the principles of hierarchical planning and make extensive use of solution approaches known as mathematical programming and meta-heuristics [10].
Advanced Planning Systems are strongly related to the concept of Supply Chain Management that focuses on the system-wide optimization of production and logistics. They extend the capabilities of the widely used Enterprise Resource Planning (ERP) systems which provide only very limited planning support. Traditional planning and scheduling systems apply a successive planning procedure that is easy to understand but that neglects capacities and usually does not produce feasible plans.

3.8 Just in Time (JIT)

“Just in time” refers to an inventory strategy that it used to improve a business’s return on investment through a reduction of in process inventory and all related costs. Just in time is driven by a series of signals, referred to as Kanban, which tell production processes when it is necessary to make the next part. Kanban can be visual signals, but are generally “tickets.” When implemented in a correct fashion, “Just in time” can help a producer improve in such areas as quality, efficiency, as well as the return on investment.

When stock drops to a certain level, new stocks have to be ordered. This helps maintain space in the warehouse and keeps costs down to a reasonable amount. One drawback of “*Just in time*” however is that the re-order level is determined by the previous demand. If the demand rises above that amount,

then inventory will be depleted a lot faster than usual and might cause customer service problem. In order to maintain a ninety five percent service rate, the company should always carry two standard deviations of safety stock. Around the Kanban, shifts in demand should be forecast until trends are established to reset the correct Kanban level. Some feel that recycling Kanban at a quicker pace can help the system flex by up to thirty percent. Recently, producers have started touting a thirteen week average as a better predictor than previous forecasts would provide.

3.9 Radio Frequency Identification (RFID)

RFID is a system of small electronic tags (comprising a tiny chip plus an antenna) that transmit data via a radio signal to RFID readers and related hardware and software infrastructure. The transmitters can be placed anywhere that tracking the movement of goods adds value to the commercial process: on containers, pallets, materials handling equipment, cases or even on individual products. The information on tags is read when they pass by an RFID reader, and that movement is captured and managed by the infrastructure. In this way, organizations are able to link the physical world to the digital world without any human interaction. Whatever actions are then triggered depends on the individual application, from basic stock replenishment at one end of the spectrum to facilitating the ultimate lean supply chain at the other.
RFID promises to revolutionize supply chains and usher in a new era of cost savings, efficiency and business intelligence. The potential applications are vast as it is relevant to any organization engaged in the production, movement or sale of physical goods. This includes retailers, distributors, logistics service providers, manufacturers and their entire supplier base, hospitals and pharmaceuticals companies, and the entire food chain.

3.10 Bar code

A bar code (often seen as a single word, *barcode*) is the small image of lines (bars) and spaces that is affixed to retail store items, identification cards, and postal mail to identify a particular product number, person, or location. The code uses a sequence of vertical bars and spaces to represent numbers and other symbols. A bar code symbol typically consists of five parts: a quiet zone, a start character, data characters (including an optional check character), a stop character, and another quiet zone. Readers may be attached to a computer (as they often are in retail store settings) or separate and portable, in which case they store the data they read until it can be fed into a computer.

4. Survey data analysis

4.1 Hypothesis

Hypothesis is a "tentative assumption or preliminary statement about the relationship between two or more things that needs to be examined".

There are various statistical tools are available for the analysis of the data, but we chosen **"**the tests of hypotheses concerning proportions" in that One tailed tests concerning single proportions chosen for the validity and reliability of the survey data obtained.
In this method the assumption of null hypothesis and alternate hypothesis are very important.

Null Hypothesis: It is an assumption about a population. It is a statistical interference by which we can state an assumption about a parameter. It is denoted by Ho.
Alternate Hypothesis**:** If the null hypothesis is rejected, then the opposite of the null hypothesis must be true. The hypothesis representing the opposite of the null hypothesis is called alternate hypothesis. It is denoted by H1.
In n successive trials, let the probability of success in a trial be p and P be the overall success which is nearby p.

The standard normal statistic for test of survey data is

$$Z= (P-p)/ \sigma$$

Where $\sigma^2 = p (1-p)/n$

Where p = proportion/ percentage of reply and
n = sample size of individual industries

P= Normal distribution,

$P \approx p$

If the Z value is in between -1.64 to +1.64 then Ho (null hypothesis) should be accepted or else the H1 (alternate hypothesis) should be accepted.

Ho: The calculated value is in between –Z to +Z then the performance of that particular strategy is true as per the survey response.

H1: The performance of that particular strategy is not authentic in that industry as per the survey.

5. Calculated survey data

5.1. Analysis of SCM strategies in manufacturing industries as per survey

Table 3: SCM strategies data in manufacturing industries

Strategy	Cement	Sugar	Electronic parts	Tool	Automotive	Steel	Textile	Pharmaceutical
Partnership with suppliers	-1.6	-1.2	-1.4	-1.0	0.7	**-2.4**	-1.5	-1.6
Partnership with customer	1.1	**-1.8**	0.4	0.7	-1.6	-1.2	0.9	**-3.0**
Just-In-Time	0.5	-1.2	**-1.8**	1.2	1.2	-1.3	0.8	-1.5
E-procurement	-0.8	**1.9**	-1.4	1.1	-1.0	**2.0**	-1.3	-1.6
Electronic data interchange	-1.2	1.0	**-1.8**	-1.0	1.0	1.1	-1.3	-1.6
Sub contracting	1.3	-0.8	1.1	-1.5	0.5	-1.4	0.8	-1.5
Vertical integration	**1.9**	1.0	1.0	1.1	1.2	**3.0**	0.8	1.0
Many suppliers	1.4	0.3	-1.0	0.7	1.2	1.5	-1.3	-1.5
Few suppliers	0.7	0.3	-1.0	0.7	1.2	1.5	1.2	-1.5
Holding safety stock	1.3	**-2.5**	-1.6	**-3.0**	-1.0	-1.2	1.0	-1.2
Use of external consultants	**-1.8**	0.6	1.0	1.0	-1.0	-1.3	**-1.8**	**-3.0**

There are some values which are beyond the range i.e. (-1.64 to +1.64) these are highlighted and the hypothesis Ho disproved.

5.2 Type of systems currently in use to support SCM

Here C= Custom-made, R= Ready-made, N= Not in use

(The highest percentage of reply is only considered for the range)

Table 4: Type of systems following to support SCM

Area of package	Cement	Sugar	Electronic parts	Tool/ machinery	Automotive	Steel	Textile	Pharma - ceutical
Material requirement planning	C=0.5	R=1.5	C= -1.0	C= 1.0	**C= -1.8**	C= -1.6	C= -1.6	C= 1.3
Manufacturing resource planning	C= -1.2	C= 0.6	**C= -1.7**	C= -1.5	C= 0.6	**C= -2.1**	C= -0.8	R= 0.6
Enterprise resource planning	C= 0.8	C= 1.0	C= 1.0	R= 1.5	**C= -1.7**	R= 0.6	C= -0.8	C= 1.5
Warehouse management system	C= -1.5	C= -1.6	C= 0.8	C= 1.3	R= 0.6	R= 1.0	**R= -1.7**	C= 1.0
Supplier relationship management	C= -1.6	**C= -1.8**	C= 0.6	C= 0.5	C= 0.5	R= -0.8	R= -1.1	R= 1.3
Advance planning system	R= 0.5	C= -0.7	R= -1.0	R= 1.5	C= -1.4	**N= -2.0**	C= 1.4	C= -0.7
Just-in-time	C= 0.7	**C= -1.7**	R= 0.8	C= -0.3	R= 0.8	C= -1.6	C= 0.8	R= -1.0
E-commerce	R= 1.3	R= 0.6	R= 1.2	**C= 1.7**	R= 1.2	N= -1.6	N= 1.0	R= -1.3
Decision support/ expert system	C= 0.7	**C= -2.1**	C= -1.6	R= -0.7	C= -1.6	N= 1.0	C= -0.8	C= 1.0
Radio frequency identification	N= -0.8	N= -1.6	N= 1.3	N= 1.0	C= 1.0	**N= -1.7**	R= 1.0	N= 1.0
Electronic data interchange	**C= -1.8**	C= -1.6	C= 1.1	C= 0.8	C= -1.4	R= 1.5	**C= -2.5**	C= -1.6
Bar coding	N= 0.6	N= -1.2	R= 1.3	N= -1.5	N= 1.0	N= 1.2	C= 0.4	R= -0.4

5.3 What type of systems needs to be preferred for SCM as per employ opinion?

Here C= Custom-made, R= Ready-made, N= Not required

If the value is in between -1.64 to +1.64 then Ho (null hypothesis) should be accepted or else the H1 (alternate hypothesis) should be accepted.

Ho: The performance of that particular strategy is true as per our survey response.

H1: The performance of that particular strategy is not authentic as per survey.

Table 5: Type of system required as per employ opinion to support SCM

Area of package	Cement	Sugar	Electronic parts	Tool/ machinery	Automotive	Steel	Textile	Pharma Ceutical
Material requirement planning	C= 0.6	**C= -1.8**	**C= -1.8**	C= 1.0	C= 1.0	C= -1.1	C= 1.0	R= -1.0
Manufacturing resource planning	C= 0.7	**C= -1.8**	C= -1.0	C= 0.5	C= 1.1	C= 1.0	R= -0.8	N= 1.0
Enterprise resource planning	R= -0.8	C= -1.2	C= -1.0	C= 1.3	C= 1.1	C= 0.6	N= 0.6	R= 1.5
Warehouse management system	C= 1.4	R= -1.6	R= 1.0	**R= -2.5**	C= -0.5	**C= -2.0**	C= 0.3	C= 0.5
Supplier relationship management	R= 1.0	R= 1.0	C= -1.6	R= 1.4	C= 1.0	**C= -2.0**	C= -1.6	C -0.5
Advance planning system	C= 1.1	C= 1.0	C= 0.8	**C= -1.8**	C= -0.5	R= -1.0	C= 1.0	R= 1.5
Just-in-time	R= 1.5	R= 0.6	C= 1.1	C= 0.7	**R= -2.4**	C= -0.6	C= 0.9	C= -0.7
E-commerce	R= 1.5	C= -1.6	N= 0.8	C= 1.0	N= 1.3	**C= -2.1**	N= -1.1	N= 1.0
Decision support/ expert system	C= 1.1	R= 0.6	C= 1.0	C= 1.2	C= -1.5	C= 0.5	**C= -2.0**	C= -0.5
Radio frequency identification	N= 0.6	N= 1.5	N= 1.2	C= 1.0	C= 1.2	**R= -2.0**	R= 1.0	N= -1.1
Electronic data interchange	C= 0.6	C= 1.5	C= -1.6	C= 0.62	C= -1.6	R= -0.5	**C= -2.5**	**C= -2.0**
Bar coding	C= 1.4	R= 1.4	**C= -2.4**	N= 1.5	C= 1.3	R= -1.4	C= -1.3	**C= -2.0**
Customer relationship management	R= 0.6	R= -1.6	**R= -1.6**	C= 1.0	C= -2.4	C= -0.8	R= -2.1	**C= 1.5**

6. Observations based on survey

More than 85% of the survey reply is within the validation range as per the statistical hypothesis calculation. With 85% of this accuracy we can have suitable findings and conclusion over survey data.

There is a significant deference between the values in each industry before SCM and after implementing SCM. Another advantage is that, it can help us to carefully decide how best SCM strategy are performing in each industry and systematic explore of various critical factors.

7. Results and findings

7.1 Results

As per the calculations the following results were tabulated as follows. The strategies or

information technology tools were following in various industries are as shown in Table.

Table 6: The various SCM strategies are used in industry

Strategy	Cement	Sugar	Electronic parts	Tool	Automotive	Steel	Textile	Pharmaceutical
Partnership with suppliers	Yes	Yes	Yes	Yes	Yes	_	Yes	Yes
Partnership with customer	Yes	_	Yes	Yes	Yes	Yes	Yes	_
Just-In-Time	Yes	Yes	_	Yes	Yes	Yes	Yes	Yes
E-procurement	Yes	_	Yes	Yes	Yes	_	Yes	Yes
Electronic data interchange	Yes	Yes	_	Yes	Yes	Yes	Yes	Yes
Sub contracting	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vertical integration	_	Yes	Yes	Yes	Yes	_	Yes	Yes
Many suppliers	_	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Few suppliers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Holding safety stock	Yes	_	Yes	_	Yes	Yes	Yes	Yes
Use of external consultants	Yes	Yes	Yes	Yes	Yes	Yes	_	_

[Here (--) line indicates the survey data out of range, so not authentic.]

As per our survey the following information system packages are used in various industries.

Table 7: The various system packages used in industry

Type of package	MRP-I	MRP-II	ERP	WMS	SRM	APS	JIT	EC	DS	RDFI	EDI
All industries	Custom-made	Custom-made	Custom-made	Custom-made	Custom-made	Custom-made	Custom-made	Ready-made	Custom-made	Not in use	Custom-made

8. Summary

Based on the results got by the questionnaire survey and detailed calculation over reliability and validity of the data the following findings are got.

1. Many Indian manufacturing industries are following supply chain strategies to become competitive.
2. The supply chain management strategies and system packages are contributing to achieve good lead time, better

manufacturing activities and reducing delayed order to customer.

3. The custom-made information system packages are more adopted than the ready-made packages.

The previous works have considered only individual supply chain strategy and its effect. Here we focused on various supply chain strategies and information system packages, their effect on manufacturing lead time, delayed orders per year, shortage of material, delayed orders to customer after due dates and % of manufacturing activities carried as per the schedule in various industries. In our study an attempt is made to study supply chain strategies in Indian manufacturing industries.

The interviews and mail survey confirms that the supply chain strategies and information system packages are contributing very much in making industries more competitive and with more capabilities then before at a faster rate. The survey method shows that how SCM strategies especially e-business application improves industry processes and consequently improve the performance of manufacturing industries.

The 8 manufacturing industries which we are selected for our survey follows almost all strategies to improve business processes. The radio frequency identification and bar coding technology are the strategies which are less proffered. With proper implication of SCM strategies and information system packages industry can achieve good lead time, less shortage of material, less chances of supplying products to customer after due date and more chances of carrying manufacturing activities as per the schedule. These are the some vital information gathered by our investigation.

By our study many Indian manufacturing industries are following supply chain strategies to become competitive. They are now on course of aligning their processes and management focus on areas of customer service, profit maximization and operational excellence. Among various information system packages the Custom-made packages are adopted by all 8 major manufacturing sector to get better benefit.

9. About Questionnaire

Based on the literature a questionnaire was designed. Various issues of Supply Chain Management have been incorporated related Indian manufacturing industries. The missing part of questionnaires by earlier researchers were taken into consideration and questionnaire developed. Details of design, content, testing and use are discussed clearly in this section.

The questionnaire contains 10 major questions, in that question no 4 contains 11 SCM strategies like partnership with suppliers and customers, E-procurement, subcontracting, use of external consultants etc… question no 5 pertaining to various information technology tools and its system of packages that the company currently following to support SCM, like MRP, MRPII, ERP, WMS, APS, JIT with its system packages like custom- made or ready-made packages. Same questions repeats in question no 6 taking into consideration of employ opinion, so what type of system they prefer for SCM. The question no 10 pertains 2 criteria with respect to IT application to SCM.

The rest of the questions are direct ones, there is no sub parts. At the last the most important information regarding SCM is what the significant difference that company got before adopting SCM strategy and after adopting SCM, with respect to lead time, number of delayed orders per year, % of scheduling activities carried as per schedule etc… These norms were followed in the present research. The unit of analysis in this study is a manufacturing industry. Clear instructions were provided at the beginning of the sections.

10. Conclusion

The previous works have considered only individual supply chain strategy and its effect. Here we focused on various supply chain strategies and information system packages, their effect on manufacturing lead time, delayed orders per year, shortage of material, delayed orders to customer after due dates and % of manufacturing activities carried as per the schedule in various industries. In our study an attempt is made to study supply chain strategies in Indian manufacturing industries.

The interviews and mail survey confirms that the supply chain strategies and information

system packages are contributing very much in making industries more competitive and with more capabilities then before at a faster rate. The survey method shows that how SCM strategies especially e-business application improves industry processes and consequently improve the performance of manufacturing industries.

The 8 manufacturing industries which we are selected for our survey follows almost all strategies to improve business processes. The radio frequency identification and bar coding technology are the strategies which are less proffered. With proper implication of SCM strategies and information system packages industry can achieve good lead time, less shortage of material, less chances of supplying products to customer after due date and more chances of carrying manufacturing activities as per the schedule. These are the some vital information gathered by our investigation.

By our study many Indian manufacturing industries are following supply chain strategies to become competitive. They are now on course of aligning their processes and management focus on areas of customer service, profit maximization and operational excellence. Among various information system packages the ready-made packages are adopted by all 8 major manufacturing sector to get better benefit.

References

[1]B.S. Sahay, Jatinder N.D. Guptay, Ramneesh Mohan "Managing Supply Chains for Competitiveness the Indian Scenario" Supply Chain Management: An International Journal 11/1 (2006) 15–24 @ Emerald Group Publishing Limited [ISSN 1359- 8546] [DOI 10.1108/13598540610642439]

[2]Choudhury Abul Anam Rashed, abdullahil Azeem, Zaheed Halim "Effect of Information and Knowledge Sharing on Supply Chain Performance: A Survey Based Approach" Volume 3(December 2010) JOSCM Journal

[3]Dharamvir Mangal, Pankaj Chandna "Inventory Control In Supply Chain Through Lateral Transshipment - A Case Study In Indian Industry" International Journal of engg.(IJE), Volume (3); issue (5)

[4]Faraz Tahiri, Mohammad Rasid Osman, Aidy Ali "A Review of Supplier Selection Methods in Manufacturing Industries"Suranaree J.Sci.Technol. 15(3); 201-208

[5] Fantazy KA, Kumar V, Kumar U (2010). Supply management practices and performance in the Canadian hospitality industry. Int. J. Hosp. Manage., 29(4): 685- 693

[6]Jinesh Kumar Jain, Govind sharan Dangayach, Gopal Agarwal "Evidence of Supply chain Management in Indian manufacturing firms: a survey" ISSN 1750-9653 International Journal of Management Science.

[7] Ms Oksana Mont, Mr. Andrius Plepys Customer Satisfaction: Review Of Literature and Application to the Product- Service Systems" International Institute for Industrial Environmental Economics. (AIST)

[8] Nilubon Sivabrovornvatan "The value of Information Sharing in Supply Chain Management"

[9] Ou CS, Liu FC, Hung YC, Yen DC (2010). A structural model of supply chain management on firm performance. Int. J. Oper. Prod. Manage. 30(5): 526-545.

[10] Prof. H. Venkateshwarlu and Ravi Akula "Benefits of Supply Chain Management Practices – A Study of Select Organizations"

[11] Wisner, J. D., Leong, G. K., & Tan, K.-C. (2005). Principles of supply chain management. Ohio, US: Thomson South-Western

[12]Ya-Ling Tsai "Supply Chain Collaborative practices: A Supplier perspective" The department of Marketing University of Stirling, Scotland.

First Author: Mr B Jeergi Arunkumar received his Bachelor's degree in Mechanical Engg (1989), Masters in Mechanical Engg (1992). He is a Research Scholar at Rayalseema University, Kurnool. He is presently working as Assoc. Professor, Department of Mechanical Engg, PDA College of Engineering, Gulbarga, Karnataka State, India and Published papers in various National/International Conference and Journals. His areas of interests include Supply Chain Management, Operation management, project Management.

Second Author: Dr S S Hebbal received his bachelor's degree in Industrial production Engg (1985), Masters in IE & OR (1990) from IIT Bombay and a Ph.D. in CAPP (CIM) (2004) from IIT Roorkee. He is presently working as a Professor, Department of IPE, PDA College of Engineering, Gulbarga, Karnataka, India. His research areas include Application of Information Technology for manufacturing, SCM, CAD/CAM/CAPP (CIM), Ergonomics, Simulation & Modeling. He has published several research papers at international and national level. He also held several positions in the university as a Chairman Board of Studies, Chairman Board of Examiners and also Dean Academic & Principal of college. He is a member of LMISTE (ISTE), MIE (Institution of Engineers) (India), MIIE(Indian Institute of Industrial Engineering).