

WEB CENTRIC STRATEGY FOR EFFECTIVE SUPPLY CHAIN MANAGEMENT

2-848

Thesis submitted in partial fulfillment of the requirements
for the award of the degree of

**MASTER OF ENGINEERING IN MECHANICAL ENGINEERING
(INDUSTRIAL ENGINEERING)**
of BHARATHIAR UNIVERSITY

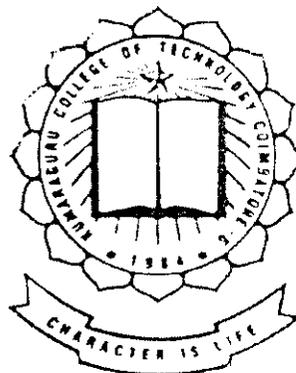
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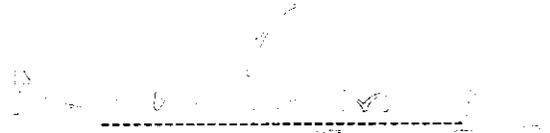
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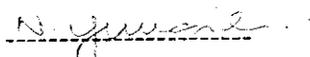
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CERTIFICATES

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This is to certify that this thesis work entitled **“WEB CENTRIC STRATEGY FOR EFFECTIVE SUPPLY CHAIN MANAGEMENT”** being submitted by **A. MURUGARAJAN** (Reg. No. 0137H0011) for the award of degree of **MASTER OF ENGINEERING IN MECHANICAL ENGINEERING (INDUSTRIAL ENGINEERING)**, is a bonafide work carried under my guidance. The results embodied in this thesis have not been submitted to any other University or Institute for award of any Degree or Diploma.

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This is to certify that Mr. A. Murugarajan, a post graduate student specializing in Industrial Engineering of Kumaraguru College of Technology, Coimbatore – 641 006, undertook a project work “Web Centric Strategy for effective Supply Chain Management” as a part of his academic requirement from June 2002 to November 2002 in our organization.

It required a systematic analysis of the present system which is taken for the project to find the solution based on the web based model. This project is very useful for implementing the concept in our organization.

This project is successfully completed and performance of the same is also good. The interest and conduct of the student were found to be good.

For DRESSER VALVE INDIA PVT. LTD.



P.K.U. Chandran
Vice President (Operations)

20th November, 2002

P-848

THE SPOT OF REALISATION

“WATER THE ROOT TO ENJOY THE FRUIT” – Proverb

My **Mother** who budded my Education

My **Father** who watered my Education

My **Teachers** who fertilized my Education

“Never mind failures, they are quite natural, they are the beauty of life. It would not be worth living without them. Hold the ideal a thousand times and if you fail a thousand times, make the attempt once more”.

- Swami Vivekananda

ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

“Nothing is complete without help. Every thing is incomplete without gratitude”.

The author express his heartfelt gratitude to **Dr. K. K. PADMANABHAN**, Principal & HOD (MECH), Kumaraguru College of Technology for having provided us with this opportunity to carry out this project.

The author would like to very much impressed and extending sincere thanks to **Prof. N. GUNASEKARAN**, Assistant Professor for his constant encouragement and valuable guidance.

The author express deep sense of gratitude and profound thanks to his Internal guide **Prof. K. KANDASWAMY**, Assistant Professor for valuable guidance and being supportive throughout the tenure of his project.

The author is deeply indebted to External guide **Mr. G. VIPIN DAS** Senior Engineer, Dresser Valve India (P) Ltd, Coimbatore for his valuable involvement, suggestions and to recommend this project in his company.

The author would like to thanks **Mr. S.M. SUNDAR**, Manager, Global Sourcing, Dresser Valve India (P) Ltd, Coimbatore for granting permission to carry out the project work in their organization and having provided the necessary facilities.

The author sincerely expresses his gratitude to his family members and friends for co-operating with him throughout this project work.

The author would like to thank all faculty members and technical supporting staff for their help, encouragement and selfless assistance in realization of this project.

Last but not least the author owes his thanks to all the persons who have directly or indirectly involved in doing this project

The author will hold this grateful feeling for the above forever.

A. MURUGARAJAN

SYNOPSIS

SYNOPSIS

In the present scenario of globalization and fluctuating markets, Supply Chain Management (SCM) is becoming significant to the corporate world. Since World War II, with the advent of operations research and management science, there has been an increasing interest in supply chain planning and management working together. Supply chain planners/managers and all members of the front middle and back end of the supply chain may enhance revenue, cost control and asset utilization as well as customer satisfaction.

In recent times, Supply Chain Management has acquired immense importance in academic and industry circles. Every industry is relying upon effective SCM as a requisite to compete on cost, quality, delivery and flexibility. A lot of research is required to study and control the supply chain dynamics in modern industries as new approaches, concepts and tools are being evolved for the enhancement of the supply chain.

SCM is an important activity in manufacturing which influences product life cycle, price levels, delivery schedules, customer satisfaction, competitions, inventory etc. The application of Information technology enhances the process of planning and management control of supply chain activities. Time and distance involved in global sourcing of suppliers and subcontractors do not match with conventional method of information flow. Hence the Web based strategy will help to make effective logistics decision in enhancing the supply chain. Traditionally SCM stressed the need for transport and storage of raw materials/semi-finished goods/finished goods/related informations, which improved sufficient, as companies were located in regions that can be accessed by normal modes of transport. But the advent of Internet and subsequent changes in supply chain network like collaborative data accessing through internet helps to reduce further the manufacturing cycle and improves inventory turnover, improves vendor relations.

This project results examine the linkages between suppliers and clients (manufacturers & customers) through web based supply chain strategy. A proposed model website interacts between members of the chain, interact the suppliers/subcontracts/Buyers, executing the purchase orders processes, online tracking, status monitoring, diagnosis of difficulties in various links of the chain, problem associated in manufacturing, quantity of acceptance, payments etc. Storing data in the website and other parts associated with integrated supply chain can help to retrieve the information quickly and effectively. It acts as a node in data network where suppliers/subcontracts can interact with the manufacturer in pursuit of the delivery of the required component and materials.

This project aims at Internet Integrated Web based working model having front and back end applications, user friendly for both vendors and buyers for their better performance.

CONTENTS

CONTENTS

| | | |
|------------------------|--|----------------|
| Certificate | | i |
| Acknowledgement | | ii |
| Synopsis | | iii |
| S. No | Chapter | Page No |
| 1. | Introduction | |
| 1.1 | Supply Chain Management | 1 |
| 1.2 | Importance of SCM | 3 |
| 2. | Company Profile | |
| 2.1 | About the Organization | 4 |
| 2.2 | Product range | 5 |
| 3. | System Study | |
| 3.1 | Literature Survey | 6 |
| 3.2 | Development of Supply Chain Strategy | 8 |
| 3.3 | Implementation of SCM | 10 |
| 4. | Analysis of Existing System | |
| 4.1 | Existing System | 11 |
| 4.2 | Shortcomings of Existing System | 13 |
| 5. | Problem Definition | |
| 5.1 | Aim of the project | 14 |
| 5.2 | Project Description | 14 |
| 6. | Proposed System | |
| 6.1 | Proposed SCM System | 15 |
| 6.2 | Effects of the System | 16 |
| 6.3 | Internet and E-commerce | 17 |
| 6.4 | Role of E-business | 18 |
| 6.5 | Web Centric Strategy | 18 |
| 6.6 | Components of Web Centric e-SCM system | 20 |

| | | |
|------------|---|-----------|
| 7. | System Design for Web Centric Strategy | |
| 7.1 | System Framework | 22 |
| 7.2 | System Design- Flow Chart | 23 |
| 8. | Software Overview | |
| 8.1 | Hardware Configuration | 24 |
| 8.2 | Software Configuration | 24 |
| 8.3 | HTML/ MS-Front Page-Over view | 24 |
| 8.4 | ASP | 25 |
| 8.5 | Database- MS ACCESS | 25 |
| 8.6 | Web Application | 27 |
| 9. | Web pages for effective SCM | |
| 9.1 | Home Page | 28 |
| 9.2 | Supplier/ Subcontractor Webpage | 29 |
| 9.3 | SCM (Company) Web Page | 32 |
| 10. | Validation of the system | |
| 10.1 | System Testing | 39 |
| 10.2 | Validation Strategy | 39 |
| 10.3 | Sources of Test Data | 40 |
| 10.4 | Level of Testing | 41 |
| 11. | Results and Discussions | 42 |
| 12. | Conclusion | 44 |

Bibliography

Appendix A: Abbreviation

1. INTRODUCTION

1.1 SUPPLY CHAIN MANAGEMENT

Shortened product life cycle, increased competition, and heightened expectations of customers have forced many leading edge companies to move from physical logistic management towards more advanced supply chain management. Additionally, in recent years it has become clear that many companies have reduced their manufacturing costs as much as it is practically possible. Therefore, in many cases, the only possible way to further reduce costs and lead times is with effective supply chain management.

In addition to cost reduction, supply chain management approach also facilitates customer service improvements. It enables the management of inventories, transportation systems, communication systems and whole distribution networks so that organizations are able to meet or even exceed their customer's expectations.

To simplify the concept, supply chain management can be defined as a loop; it starts with the customer and ends with the customer. All materials, finished products, information and even all transactions flow through the loop. However, supply chain management can be very difficult task because in the reality, the supply chain is a complex and dynamic network of facilities and organizations with different, conflicting objectives.

What has then enabled the effective implementation of supply chain management? The answer is found from the rapid developments in information and communications technologies. Use of databases, communication systems, and foremost advanced computer software are crucial for the development of a modern cost effective supply chain management.

Supply Chain Management focuses on the organizing, integrating and operation of the complete materials management function. The Supply chain Management system must coordinate the revision of plans/schedules across supply chain functions.

Definitions

Definition of Supply Chain Management into three general categories.

- **The Management of the flow of goods from suppliers to final user.**
- **The system-wide co-ordination of product and information flow.**
- **The development of relationship and the integration of all activities that provide customers value throughout the distribution channel. [5]**

B.S. Sahay discussed in this paper [6] about Supply Chain Management

Supply Chain Management is the strategic integration and co-ordination of business functions within a particular company and across the supply chain network, for improving long term performance.

The Council of Logistics Management define the Supply Chain Management as

Supply Chain Management as “the process of planning, implementing and controlling efficient and cost effective flow of materials, in-process inventory, finished goods and related information from point-of-order to point-of-consumption, for the purpose of conforming to customer requirements”.

Ryoichi Watannabe discussed in this paper [10] about the Supply Chain Management

Supply Chain Management deals with the co-ordination of all activities that impact the product flow from its source to the end for the purpose of creating value in the end product.

The Organization of its all internal and external processes required for smooth operation of a supply chain is called Supply Chain Management.

1.2 IMPORTANCE OF SCM

As worldwide economic competitiveness increases an increasing number of firms are combining domestic and international sourcing as a means of achieving sustainable competitive advantage. With greater global competitiveness, supply chain functions have become more complex. These changes have brought about a need for greater understanding of these linkages. Firms that are unable to gain coordinated strategic control over their supply chain processes will be unable to succeed in the emerging international economy. Managing the supply chain is an effective method to reduce operational costs and increase customer satisfaction. By managing the internal supply chain, we can improve business value and cut down the costs of internal operations

In India, companies are linked to their suppliers and customers through phones, faxes and recently electronic data interchange and very small aperture terminal. What is new now is that companies are using special software to do what used to be done manually earlier. Supply Chain systems deal with and analyze information from different points on the supply chain. If one supplier fails to deliver, the SCM software will help managers to locate another who can. SCM also implements simultaneous processes and incorporates various constraints in operations. ERP lacks the complex simulation and optimization models to take care of needs like dynamic scheduling, backward scheduling and planning. SCM can be implemented with an ERP package though world leaders in SCM like Manugistics etc. sell it as a stand-alone product. SCM shows a way to cost optimization all along the chain, starting from customer order to delivery of goods to him. It involves coordinated management of material, information and manpower in the entire process within an organization and its objective is to optimize the total cost, improved total quality, maximize customer service and improve profit. The companies need in order to achieve supply chain improvement goals, participants most often replied Strategic Planning and System Integration.

COMPANY PROFILE

2. COMPANY PROFILE

2.1 ABOUT THE COMPANY

Corporate Philosophy

“To provide high-quality products and services to our customers, satisfying their ever-changing demands, by understanding their requirements and expectations, through incessant technological innovation and through quality improvement programs”.

Overview

Dresser Valve Division (DVD) is part of Dresser Equipment Group, one of the strategic business units of the Halliburton Company. The corporate headquarters of the Halliburton Company is in Dallas, Texas, USA. DVD started functional operations in India by mid 1995 by establishing sales and marketing activities. In the year 1997, the division gained wholesome operations in the country by manufacturing some of the division's products. Dresser Valve Division manufactures, markets and services a wide spectrum of valves in its twenty-even manufacturing units located all over the globe.

In 1999, the manufacturing unit at Coimbatore expanded its operations, moving to Eachanari, to manufacture Masoneilan control valves, accessories and digital level transmitters and further intends to add other product lines of the division as well, catering to the market need and complementing the business strategy of the division.

2.2 PRODUCT PROFILE

There are various ranges of products manufactured by the company. Some of them are

- Control valves
- Digital level transmitters
- Safety & Safety relief valves
- Ball Valves
- Gate, Globe & Check valves
- Plug valves
- Butterfly valves
- Actuators & array of allied products and accessories.

Operations:

Marketing & servicing of all products of Dresser Valve Division.

Manufacturing of DVD products catering to the Indian Market

3. SYSTEM STUDY

3.1 LITERATURE SURVEY

As increasingly competitive environment calls for speedy, cost efficient and reliable supply chain, companies are focusing their attention in developing superior supply chain performance. Since 'What gets measured, gets measured' the companies have to develop metrics measure performance of their supply chain. A number of technologies and managerial attention have gone into improving supply chain performance.

M.L. Singla discussed in this paper [9] about the Supply Chain Management

In today's hyper competitive market, the ability to respond to customer's requests with speed and accuracy is vital for success. There fore, a company's continued process today depends upon its ability to build information architecture to enable it to respond to changing market dynamics. Therefore, high-speed platforms for real time response have to be erected to provide effective on-line integration with its buyers and suppliers.

In the past the suppliers, the assembly units and the customers did not enjoy much of trust and fellow feelings. Each of the members of the value adding chain attempted to optimize its own goals focused upon low inventories and maximal profits. These individual goals wear in conflict and resulted in disharmony.

Ryoichi Watanabe discussed in this paper [10] about the Concept of Supply Chain Management

Supply Chain Management has been conceived as integrative business philosophy and implementation actions to manage material, information and cash flow from raw material excavation to the ultimate end use (cooper et al, 1997). It extends the concept of functional integration beyond organization boundaries and enables integration across their supply chain network.

Supply Chain management which in the broadest sense involves the link between the supplier and the assembler and ending with customer. It is a value adding a chain, from the supplier to customer. In the present scenario industry carry out in house manufacturing of core competency items only. The rest of 90%-95% items are procured through supplier and the main industry carries out the assembly process. The finished product is send to dealer who meets the customer demand.

B.S. Sahay discussed in this paper [6] about Supply Chain Management

In earlier days, the control of relationships lay in favor of manufacturers, who exercised power and dictated relationships in the supply chain with channel members and customers. But over the last few years, the dynamics of relationship have changed as the power has gradually shifted from manufacturer to intermediaries and consumers. With globalization, information technology revolution and advances in telecommunication and technology consumers are more aware and have access to an extended market, cheaper and better quality products. The last three decades witnessed the sequential rise of MRP, MRP-II and ERP as information technology tools to ease business transactions, optimizing factory operations. So far, all of these methods focused on the problems within a single plant of company. After the manufacturing industries did everything they can to improve the efficiency of operations in their own companies, they realized that big inefficiencies still existed between the borders in a supply chain. Suppliers, Vendors and other plants had been out of the focus of the problem solution horizon.

Lawrence discussed in this paper [15] about the trends used in Supply Chain Management

Supply Chain Management, Which once centered on the distribution of products to customers, has now assumed a broader perspective of full of logistics with strategic and financial importance within the organization. Information Technology could be used to gain competitive advantage in an industry. IT enabled supply Chain Management provides an innovative

approach for integrating manufacturing and distribution. The Supply Chain decision, which enables end to end optimization throughout, can be made with the help of modern intelligent and decision support tools. The growing use of Internet for conducting business transactions is widely regarded as a major revolution in business practices.

Latest development in supply chain management is in Internet and e-commerce. Implementing of internet technology would facilitate external and internal communications between suppliers, company and customers and also regional locations information technology.

3.2 DEVELOPING A EFFECTIVE SUPPLY CHAIN STRATEGY

The Supply Chain is the flow of both information and material through a manufacturing company, from the supplier to the customer. Traditionally the flow of material/information has been considered only at an operational level, but this approach is no longer adequate. It is now essential for businesses to manage the supply chain in order to improve customer service, achieve balance between costs and services, and thereby give a company a competitive advantage. In supply chain to integrate the supply chain i.e., to ensure that all the functions and activities involved in the chain are working harmoniously together. To develop an integrated supply chain means of information and material by three stage process. This can be identified for developing an effective Supply Chain strategy

i. Evaluation of the competitive environment

This will normally involve

Understanding the current strategies

Examining the current strategies

Deciding on effective strategies

ii. Review of Existing Supply Chain Operations

It involves

Developing a Internal and external model

Identifying the existing activities (strategies)

Listing improvement techniques for these activities

iii. Developing the Effective Supply Chain Management

The aim here is to develop an integrated supply chain to achieve the effective chain, concentrating it appropriate on those key elements identified during review of existing supply chain operations.

Integration of Supply Chain

Functional Integration:

The aim will be to finish to remove the separation between functions within the organizations.

Internal Integration:

The aim will be to improve the interfacing the activities such as Materials, Assembly and Customer

External Integration

Finally the objective will be to improve the input and output side interfaces of the organization improving information flow. Fig 1 shows Integration supply chain on the both internal and external integration

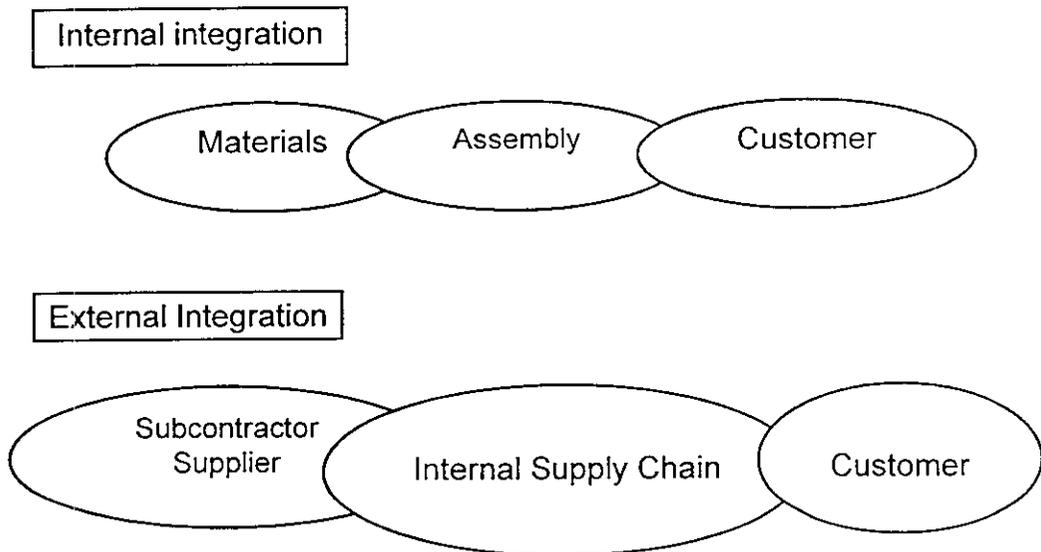


Fig 1. Integration of Supply Chain

3.3 Techniques used to implement Supply Chain Management (SCM)

There are several techniques used for implement the supply chain. The Common techniques of SCM can be identified from literature. These include include:

- Developing strong and long-term relationship with supply chain members to improve products, reduce cost ,and develop more efficient processes and procedures.
- Dealing with fewer suppliers and carriers to encourage closer working relationship and allow greater use of supplier expertise.
- Working with supply chain members to reduce channel wide inventory levels and cycle time, so as to reduce overall costs and improve customer services.
- Regularly sharing information with supply chain members, allowing quicker response to changes and better short term planning
- Working with supply chain members to maintain high quality products and services to ensure user satisfaction.
- Building commitment at all levels of the organization to encourage implementation and continued use of SCM techniques. These techniques are shown in fig.2

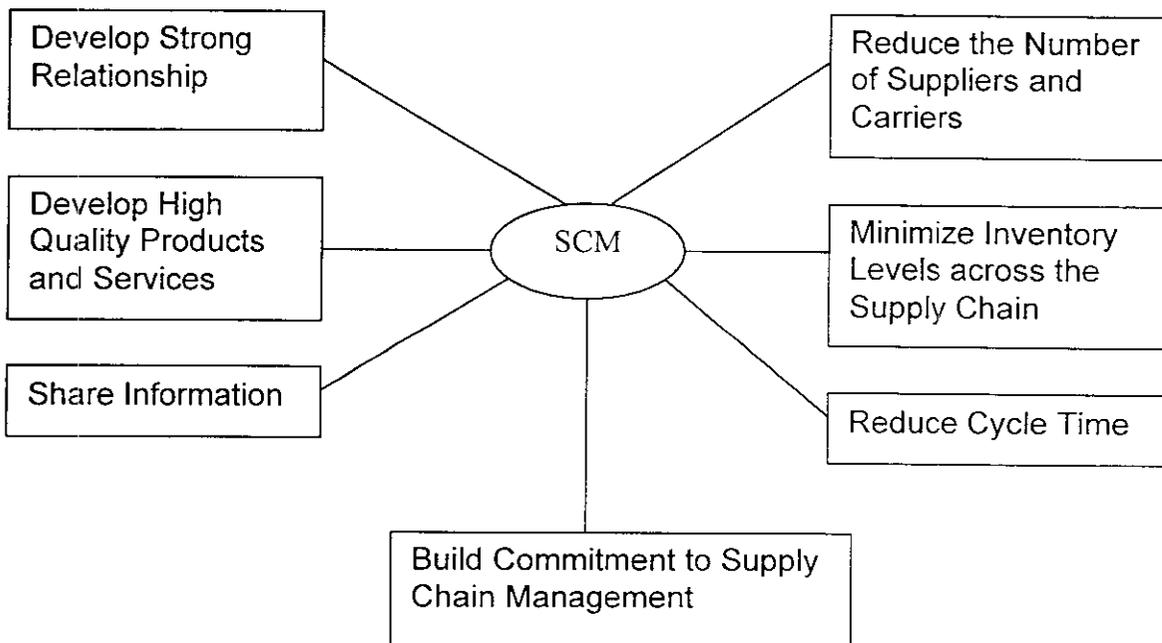


Fig 2. Techniques Used to Implement Supply Chain Management (SCM)

ANALYSIS OF EXISTING SYSTEM

4. ANALYSIS OF EXISTING SYSTEM

4.1 EXISTING SYSTEM

An organization typically offers a number of products and services, purchases materials from a wide range of suppliers, and sells to multiple customers. From the perspective of a typical organization, each of its supply chains will have both internal and external linkages.

- ✦ The company sources the materials from various places and subcontracts these materials to different vendors to get finished component.
- ✦ The entry for both these activity in this company is the subcontract department.
- ✦ Based on the supply of materials and lead time taken by raw material suppliers, subcontract department issues orders to components manufacturing vendors.
- ✦ This process involves monitoring or purchase orders, payment details, progress of work, testing, certification etc., resulting in two way flow of information.
- ✦ The finished components are taken into stock at the stores and send for assembly as when required.
- ✦ In above existing system information is not properly supplied by the subcontractor/suppliers or the needs are not properly expressed by the company. The existing model shown in fig 3.

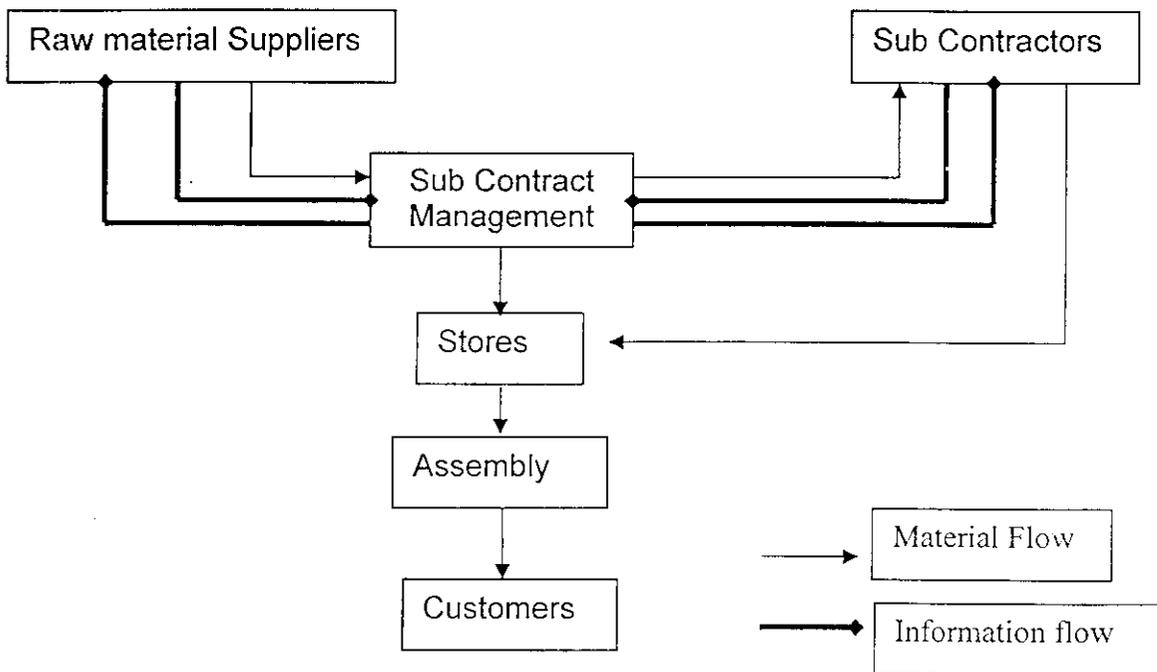


Fig 3. A Simplified Existing model

4.2 SHORTCOMINGS OF EXISTING SYSTEM

Handling/Transport of Materials

The existing system raw material is delivered to the company and then goes for further processes to the subcontractors. It involves double handling and increases the storage cost, transport cost and also delay in transport and handling of the materials from company to supplier and company to the subcontractor.

Delay in information flow

There is lack of information flow, across the chain to contact respective persons in supplier and subcontractor on a time.

Overrun in delivery time

In the existing system delay in the information affects the processing of material with subcontractor. It results in overrun of delivery time of the machined component.

Problem in tracking the material flow

There is more number of suppliers/subcontractors for the company. Some times order flow over phone itself. It causes difficulty to track the material flow for the further processes, as there is no documentation.

Problem in identifying the progress of work

There is no system of informing the progress of work by the subcontractor to the company. This results in the company, unable to split the supplies to meet urgent requirements.

Updating the dispatch schedule if any change in delivery date

Due to lack of information flow, delivery schedule could not be updated by the company.

PROBLEM DEFINITION

5. PROBLEM DEFINITION

5.1 AIM OF THE PROJECT

The objective of this project is states below as

The main Objective of implementing supply chain management are to reduce inventory level, increase customer satisfaction and build competitive advantage to create customer value. Based on the existing system analysis, aim of this project as

Adhering delivery of products through synchronized operations of the physical flow of goods, materials, services and associated informations from sourcing through Web centric strategy for effective Supply chain management system.

5.2 PROJECT DESCRIPTION

To identify and implement supply chain management performance by web page tools of following areas related with supply chain management

Effective relationship management

Vendor development

Minimizing uncertainty in supply chain operations

Order processing

Other Areas related to SCM

PROPOSED SYSTEM

6. PROPOSED SYSTEM

6.1 PROPOSED SCM SYSTEM

The proposed model is developing a web page contents to communicate the suppliers and subcontractors. The proposed system concentrates all the information is transactions through web page. This system examines the integration between suppliers and clients through web based supply chain strategy. A proposed model web site interacts between members of the chain, interact the suppliers/subcontracts/customers, executing the purchase orders processes, online tracking, status monitoring, diagnosis of difficulties in various links of the supply chain and website integrated the supply chain can help to retrieve the information quickly and effectively.

It acts as a node in data network where suppliers/subcontractors as interact with the manufacturer in pursuit of the delivery of the required component and materials. And also system gives practice for effective supply chain strategy in the organization for improving the performance of the company from the present subcontract department to supply chain.

Web based strategy is highly secured system. It proves to be a very effective strategy, which is an interface between the suppliers/subcontractors/customers and the company. All the information required is to be On-line. This is an effective way for retrieval from data. This system eliminate the flow of materials directly places through the subcontractors.

Since manual intervention does not participate, all proceedings are highly reliable. Information is frequently updated according to the day to day changes. Time factor is greatly reduced by the fast online working.

The proposed system names as e-SCM system to integrate the information flow through suppliers and subcontractors from company. The proposed system flow model shown in fig 4. & fig 5.

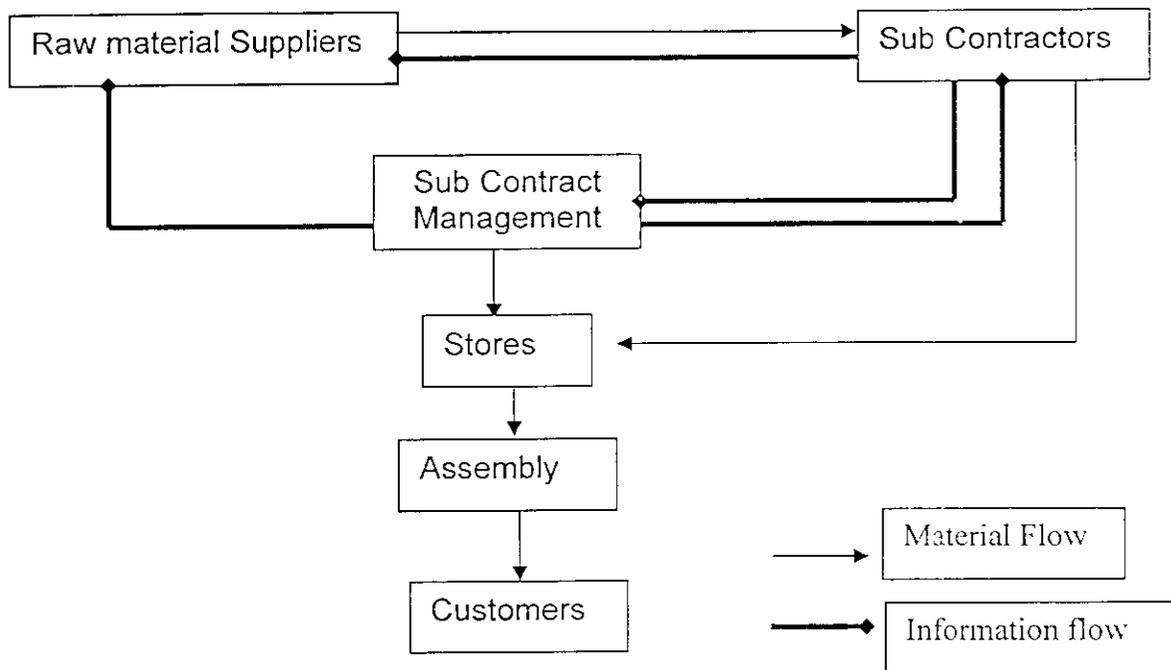


Fig 4. Proposed model

6.2 EFFECTS OF THE PROPOSED SYSTEM

The effects observed from the proposed model listed below as:

- The proposed model eliminates the works involved in the information flow through the company, suppliers and subcontractors.
- This model links the suppliers and subcontractors. The contacts are directed through the company.
- The subcontractors to machine the product directly got from suppliers via Internet based communications directed from the company.
- It eliminates the every suppliers and subcontractor intimating about the problem by phone communication.
- Delay can minimized based on the information flow about the materials and other related information about the components.

- Every subcontractor supplies the finished product instead of the existing system.
- The system executes the progress of work done by subcontractors by up to date information about the component.

6.3 INTERNET AND E-COMMERCE

The Internet is a global network of computers that communicate using a common language. It is similar to the international telephone systems, no one was to controls the whole thing, but it is connected in a way that makes it work like one big network. It could be said that the Internet is the most valuable legacy left over from the cold war. It originally came into begin as the ARPA net, which was founded by the U.S Defense Department Advanced Research Projects Agency to link academic research centers involved in military research.

Internet based transactions processing are significantly improving production and logistic effectiveness. Vendors can obtain purchase orders via the Internet to initiate their own production process and also confirm receipt and acceptance of purchase order. This also promises to improve customer satisfaction and efficiency. Internet and web technology are the hottest topics in SCM lately. The business community has realized now that internet is a very useful tool for communication. People connected via internet now send more emails in a day than phone calls or Physical mails. E-mails are a very good media for communication for individuals. When it is extended to industries, business use of Internet is E-commerce. Here the Communication is between a company, suppliers, subcontractors and customers.

6.4 ROLE OF E-BUSINESS IN A SUPPLY CHAIN

E-business is the execution of business transactions over the Internet. Supply chain transactions that involve e-business include the flow of information, product and funds. Companies conducting e-business can perform some or all of the following supply chain transactions over the internet. Organization which dreams of using Internet technologies for creating business value will pass through e-business applications. By managing the internal supply chain, we can improve business value and cut down the cost indirectly in internal operations.

6.5 WEB-CENTRIC SUPPLY CHAIN

This project proposes the e-SCM system for Web-Centric strategy in supply chain. It is characterized by the marriage of the internet and supply chain management to the company and has resulted in the birth of Electronic Business applications. These internet enabled applications have internet integrated all branches of the Supply chain and emerged as the most cost effective means of supply chain operation. It helps in providing information across the supply chain-allocation of fixed forms in the site, placing the order to suppliers/subcontract via Internet, communication between the members of the chain-connects the hub with back-end members of the chain, recording useful performance data about the supply chain and tracking the orders.

E-Business applications (e-procurement, e-commerce and e-collaboration applications) change the supply chain from a linear, rigid chain into a dynamic chain based on an information hub called an ERP controlled information hub serves as the nerve center of the central client's operations and every other part of the supply chain is now a spoke connected to the hub, as well as each other spoke, through the Internet. It shown in the Fig 5.

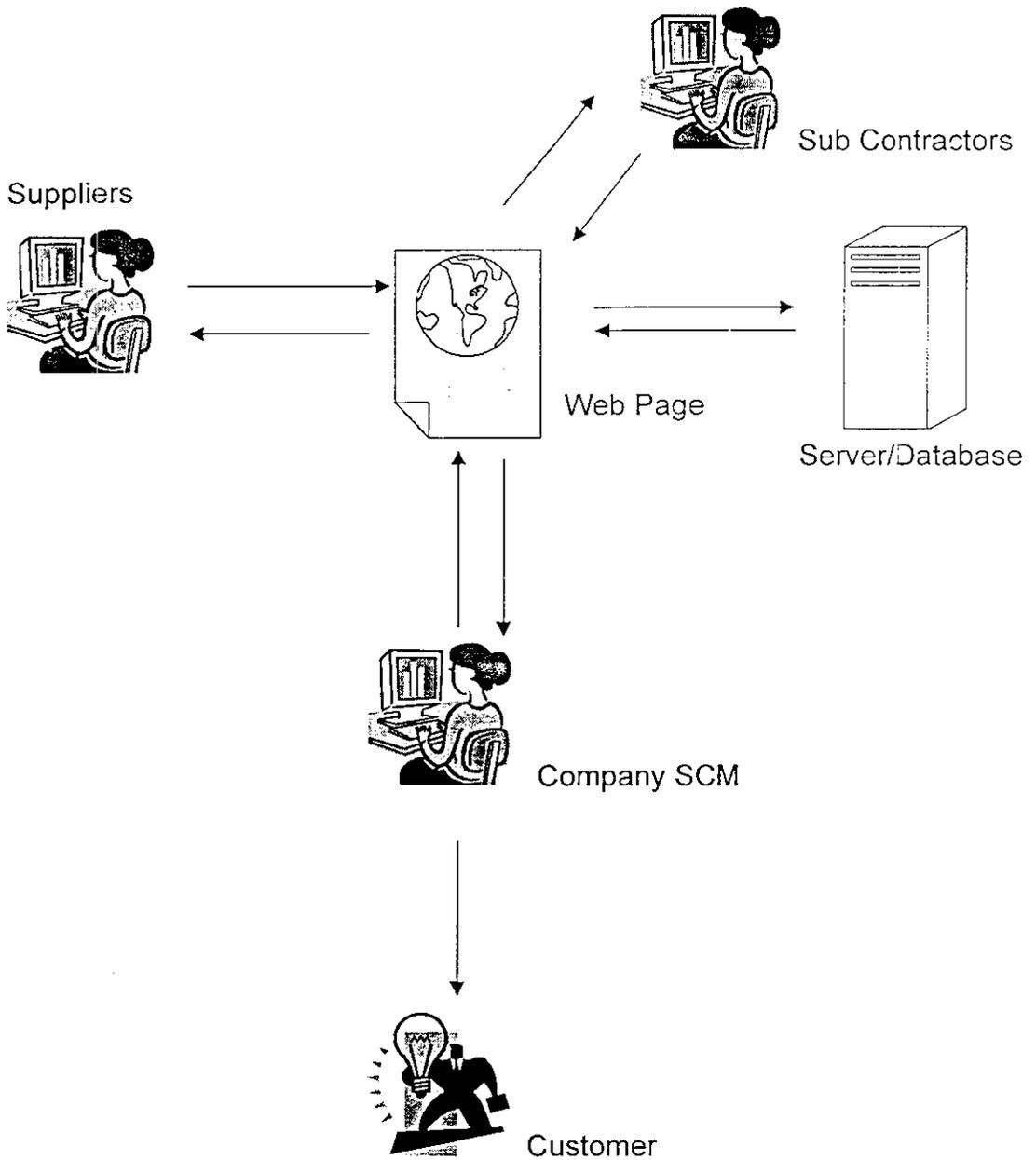


Fig 5. Model flow of Web centric e-SCM system

6.6 Main Components of Internet Enabled, Web Centric Supply Chain

e-SCM system business applications have evolved into the most intelligent and optimized tools with which to execute front-end and back-end operations of information system that links multiple companies in the chain.

The center of the e-business supply chain is an information hub (a node in a data network where multiple organizations interact in pursuit of supply chain integration), where incoming information is quickly processed and then sent out of other chain members. The hub also has capabilities of data storage and push/pull publishing. The Information hub would be a website or a server running on the Internet. The Website would run a supply chain, as designed software application for supply chain that serves as the nerve center of the organization.

A marriage between SCM and e-business can be termed as e-SCM. e-SCM can be characterized by cultural changes as well as changes in management policies, organizational structures, business processes and performance measures. An effective e-SCM would be the following components.

Web enabled data exchange forms like

Enquiry form

It consists of specification about the material to contact the suppliers and subcontractors from the company.

Intimation form

Intimation of the message and any other information are send to the suppliers and subcontractors from the company (SCM)

Status monitoring

It is output of the proposed system. It indicates the status about the component if the company (SCM) entry the part code and part description.

Receipt of Materials

It indicates the materials received from the suppliers and subcontractors and also quantity of acceptance to be indicated through mail.

Purchase Order Placement form

It is ordering process of a company to suppliers and subcontractors.

Purchase Order Acceptance form

It indicates the receipt of order acknowledgement from the suppliers and subcontractors

Problem declaration form

It should declare the problem in the web page mail about the component under the operations in the subcontractors.

Payment details form

Details about the payment send to the suppliers and subcontractors.

7. SYSTEM DESIGN

7.1 SYSTEM FRAMEWORK OF e-SCM SYSTEM

System frame work is described below in fig 6. It shows that website to communicate the suppliers/subcontractors from the company. It stores the information across the chain between the members to relate about the materials, finished components details, problem under processing of machining. The information across the chain to be stored in the database and up to date information are to be retrieved from the system.

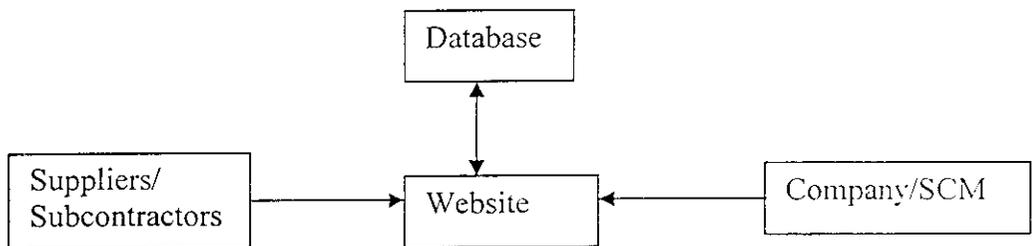


fig 6. Frame work of Web Centric model

7.1.1 System operation

The suppliers and subcontractors accessing through the internet can log on to the website when e-SCM system websites using an ID/ Password (see fig 7) to place the purchase orders from the company to suppliers and subcontractors. The information entered into the web server gets automatically uploaded into the database. The suppliers and subcontractors side interact with the website and accept the order form through net. The orders will be grouped according to the expected date of delivery, status about the part, receipt of order of the material, payment details to send via web site and all other information passes through Web page.

7.2 SYSTEM DESIGN- FLOW CHART

The Web Centric model consists of following procedure to enter into the web site in the web page. This flow chart represents the steps to interact with the website.

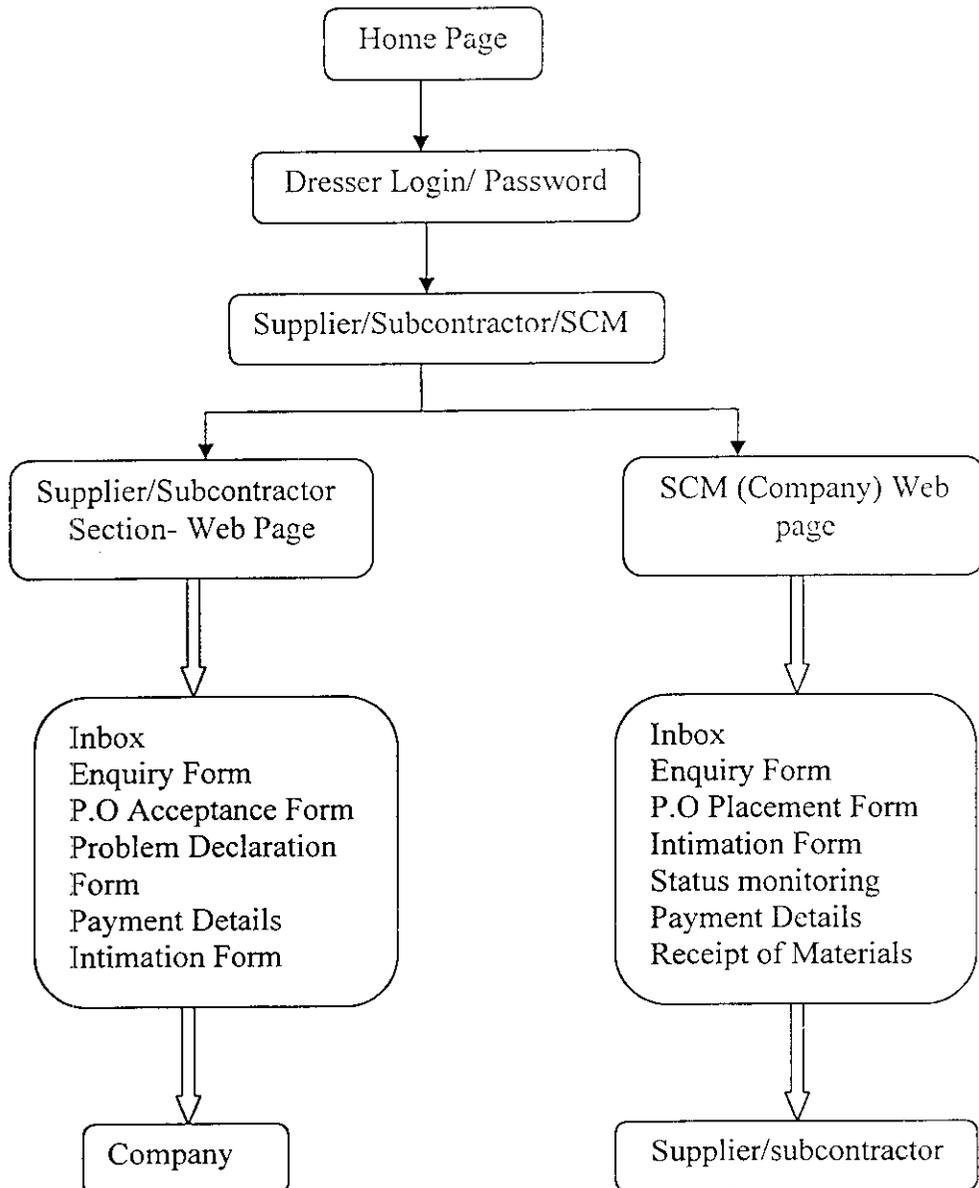


Fig 7. Flowchart for e-SCM system

SOFTWARE OVERVIEW

8. SOFTWARE OVERVIEW

8.1 HARDWARE CONFIGURATION

System : Mini
Processor : Pentium III & above

Memory

RAM : 128MB
CACHE : 256KB
HDD : 1 GB (20GB)
MODEM : External- 56Kbps

8.2 SOFTWARE CONFIGURATION

Server : Windows NT
Client : Windows 98/ 2000/Windows NT workstation
Language : VB Script
Markup Language : HTML
Browser : Internet Explorer 5.5
Web Server : IIS

8.3 HTML/FRONT PAGE- OVER VIEW

The World Wide Web has become a critically important communication medium and the language of the web is HTML, the Hyper Text Markup Language. The latest Version of HTML 5.0 offers groundbreaking improvements in the areas of internationalization, accessibility, interactivity and style sheet. HTML is a language that is surprisingly simple and elegant. The Web's popularity is built on the fact that any one learn HTML and create attractive and completing web pages.

HTML has been shaped by companies like Netscape and Microsoft and the opinion of web authors and designers from all over the world. Even though HTML is not a traditional programming language, it is like code which means that HTML consist of a set of programming instructions that are interpreted by a browser.

A set of instructions embedded in document is called Markup Language. These instructions describe what the document text means and should look like in a display. Hyper Text Markup Language (HTML) is the language used to encode World Wide Web documents. It is a document layout and hyperlinks specification language that defines the syntax and placement of special embedded directions that are not displayed by a web browser, but tells it how to display the contents of the documents including the text, images and the other supported media.

HTML LAYOUT

An HTML document consists of text, which comprises the content of the document and the tags which, defines the structure and appearance of the document.

The structure of an HTML document is simple consisting of outer <HTML> tag enclosing the document header and body

```
<HTML><HEAD>
```

```
<TITLE> the title of the HTML document </TITLE>
```

```
</HEAD>
```

```
<BODY>
```

This is where the actual HTML documents

Text lies is which is displayed in the browser

```
</BODY>
```

```
</HTML>
```

Each document has head and body delimited by the <HEAD> and <BODY> tag. The head is where you give your HTML document a title and where you indicate other parameters the browser may use when displaying the document. The body is where you put the actual contents of HTML documents. This includes the text for displaying the text. Tag also references special and indicate the hot spots that link your documents.

Front page enables you to create Web pages using a familiar word processing-like interface. It allows adding and formatting text, pictures, and other page content using menus and toolbar buttons, and FrontPage generates the corresponding HTML tags in the back-ground. Use dialog

boxes to create handy, informative forms. Establish a consistent look for the whole site or portions of the site using cascading style sheets. It also helps to maintain the constantly changing structure and content of your site as a whole.

8.4 ASP (ACTIVE SERVER PAGES)

An ASP page is an HTML page with two elements added. First, the file name ends with the ".asp" extension, so that the web server knows that it's an ASP file. Second, the file includes some server side code that contains instructions for tasks that the sever should perform before delivering the page to the web browser. It is probably the best way to mix HTML and simple programming language in a Windows Environment. ASP pages run with Windows NT and Windows 2000, because it's built into IIS, it's easy to use and it's powerful. ASP can be written in VB Script.

8.5 DATABASE –MS ACCESS

Microsoft access is an interactive relational Database Management System for MS- Windows, Which stores and retrieves information according to relationship that is defined. MS Access takes full advantage of graphical power in windows, giving visual access to data and simple, direct ways to view and work with information. MS Access puts the power to organize data according to subject, so we can store information about how different subjects are related so that it's easy to bring related data together.

In MS Access a powerful Query Builder has been provided to find information from database quickly by generating queries. It allows building sophisticated, user-friendly data entry screens called forms automatically with the help of its wizards. It also helps to produce reports to meet the exact specifications.

Using MS Access Wizards and Macros we can automate most tasks easily without need of for programming. For highly specialized data management needs, MS Access comes with Access Basic, powerful database programming language.

MS Access builds upon its rich tradition of information by extending the role of desktop database to web. Ms Access integrates data from a wide variety of desktop database to web. MS Access integrates data from a wide variety of format, including HTML and provides user an easy way to find answers, shares timely information, and builds faster solutions.

8.6 WEB APPLICATION

To open a web page in our browser we usually either type in the URL (Universal resource locator) or click an existing link to the URL. Once we submit this request and the web browser receives it, the web browser locates the web pages is also referenced by a URL and requests it form the server in the same way as it requested the main HTML page.

8.6.1 Web Browser

The Web browser can be sought of as a universal user interface. When we are browsing,

The web browser's responsibilities are that of presenting web content, issuing requests to the web server and handling and results generated by the request.

8.6.2 Web Server

At the heart of any web interaction is the web server. The web server is a program running on the server that listens for incoming requests and services those as they come in. Depending on the type of request, the web server might look for a web page, or it might execute a program on the server.

A web application typically follows a three tiered module. The first tier of the presentation Layer in which, in the case of a web application includes not only web browser but also the web server, which is responsible for assembling the data into a presentable format. The second tier is the application layer. It usually consists of some sort of script or program.

Finally the third tier provides the second tier with the data that it needs.

*WEB PAGES FOR EFFECTIVE
SCM*

9. WEB PAGES FOR EFFECTIVE SUPPLY CHAIN MANAGEMENT

9.1 HOME PAGE OF e-SCM SYSTEM

E-SCM system home page includes the log on of suppliers and subcontractors using an ID/Password. It indicates the profile, quality policy, types of products manufacturing by the company. It also intimate the members in the chain, approved vendor list and newsletters room from the company.

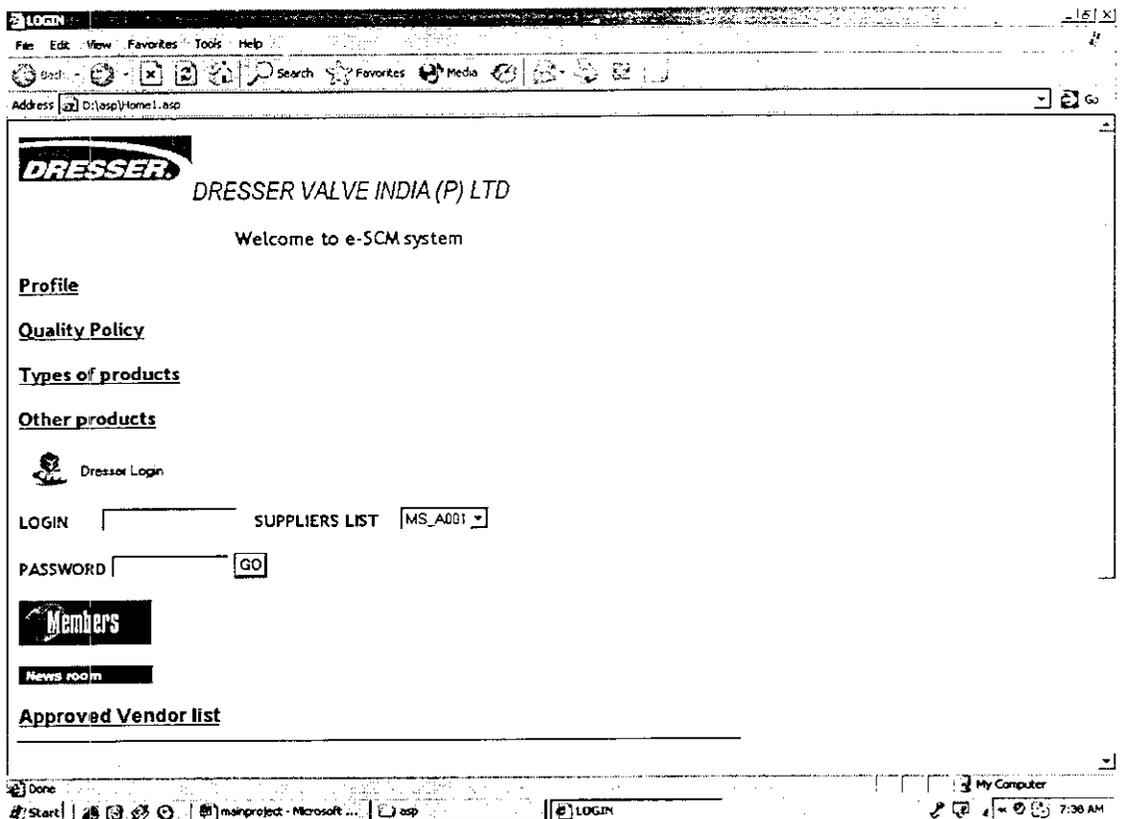


Fig 8. Home Page of e-SCM system

9.2 SUPPLIERS/ SUBCONTRACTORS WEB PAGE

This web page suppliers and subcontracts interact with the company for communicating information as in the form contents in the page. Web based content tools in this section are Enquiry form, P.O Acceptance form, Problem Declaration form, Payment details, Status problem, Intimation form, Dispatch schedules.

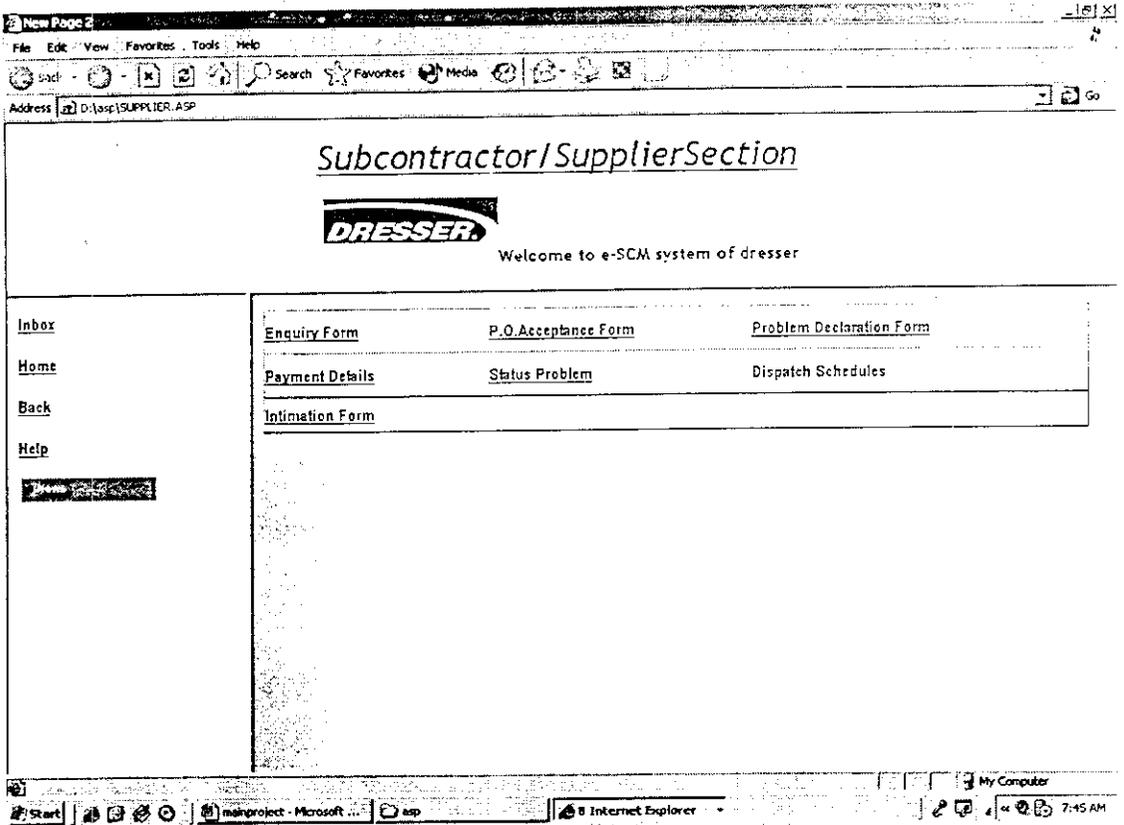


Fig 8. Supplier/subcontractor webpage

Problem declaration form

It declares the problem in the web page mail about the component under the operations in the subcontractors. [Fig 9]

DRESSER Dresser Valve India (p) Ltd e-SCM system

Problem Declaration Form

Vendor Code

Part Code Part Description

P.O Order No Delivery Date

No Of Quantity Order Finished Quantity

Status

Proposed Delivery Date For Remaining Quantity

Defects Noticed [Problem Identified Area]

Defective Qty Raw Material

Machining If any Other

Replacement

Qty Required

Sumit: Time For Replacement Material

Fig 9. Problem Declaration form

Purchase Order Acceptance form

It indicates the receipt of order acknowledgement from the suppliers and subcontractors. [fig10]

The screenshot shows a web browser window with the following content:

- Browser Address Bar:** Address: D:\asp\purchase order n.asp
- Page Header:**  Dresser Valve India (p) Ltd
- Text:** Welcome e-SCM system
- Section Title:** PURCHASE ORDER TRIAL-ACCEPTANCE FORM
- Section:** Receipt of Order Acknowledgement
- Form Fields:**
 - Special Instructions:
 - Your Reference Number:
 - Contact Person:
 - Address:
 - Prepared And Verified:
- Buttons:** Send, Modify, Back to Home Page

The browser's taskbar at the bottom shows the Start button, taskbar icons for LOGIN, To, and MEproject1, and the system tray with the time 10:12 PM.

Fig 10. Purchase Order Acceptance form

9.3 SCM(COMPANY) WEB PAGE

The company enters into this page for communicating the information to click the forms to send to the corresponding suppliers and subcontractors. Forms in the site are enquiry form, Purchase order placement form, Receipt of materials, Payment details, Status monitoring, Queries, Documentation, Quality records, Supply components order form.

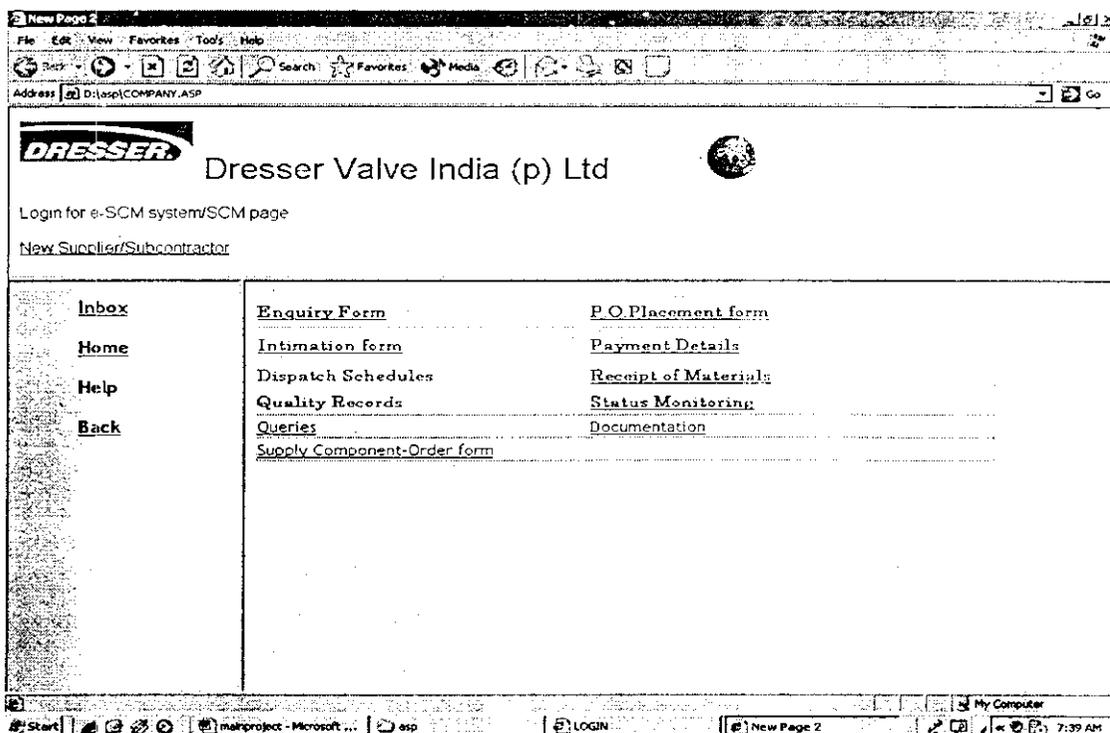


Fig 11. Company (SCM) Webpage

Enquiry form

This form specifies enquiries about the material availability to the suppliers and subcontractors. It shown in fig 12. /12a.

ENQUIRY FORM

File Edit View Favorites Tools Help

Back Forward Home Search Favorites Media

Address D:\asp\ENQUIRY.ASP

DRESSER
Dresser Valve India (p) Ltd

e-SCM system of Dresser

Enquiry Form

Part Description Part Code

Material Specification If any other

Size

Diameter mm

Length x breadth mm

Height mm

Hardness Details

Sheet mm

Test Certificates Requirement for the Material

Material Test Certificates Chemical Composition Certificates

Heat Treatment Hardness Check Certificates

Done My Computer

Start mainproject - Mic... asp LOGIN New Page 2 ENQUIRY FORM 7:40 AM

Fig 12. Enquiry form

ENQUIRY FORM

File Edit View Favorites Tools Help

Back Forward Home Search Favorites Media

Address D:\asp\ENQUIRY.ASP

Test Certificates Requirement for the Material

Material Test Certificates Chemical Composition Certificates

Heat Treatment Hardness Check Certificates

Ultrasonic Test Radiography Test Certificates

Hydro Static Testing

Specific Requirements

Quantity Required kg

Supply Period

Supply Point

Via

Special Instructions

Prepared and Verified

For Dresser Valve India

Send Modify Back

Done My Computer

Start mainproject - Mic... asp LOGIN New Page 2 ENQUIRY FORM 7:41 AM

Fig 12a. Enquiry Form.

Intimation form

It shows intimation of the message and any other information send to the suppliers and subcontractors from the company(SCM). It shown in fig 13

The screenshot shows a web browser window displaying the 'Intimation Form' in the 'e-SCM system' of Dresser Valve India (p) Ltd. The browser's address bar shows 'D:\asp\Intimation.asp'. The form includes a 'To' dropdown menu, a 'Vendor Code' text field, and a large text area for 'If any Other Information type here'. Below this, there is a section for 'Regarding Purchased Order' with a 'P.O Order' dropdown menu (currently showing 'Purchased order rejected'), a 'P.O Order No' text field, and a 'P.O Order Date' text field. At the bottom of the form are three buttons: 'Send', 'Modify', and 'Back to Home Page'. The browser's taskbar at the bottom shows the time as 7:51 AM and the active window as 'Internet Explorer'.

Fig 13. Intimation Form

Purchase Order Placement form

It is ordering process of a company to suppliers and subcontractors. It shown in fig 14/14a.

DRESSER VALVE INDIA

File Edit View Favorites Tools Help

Address <D:\asp\PO Placement.asp>

DRESSER
DRESSER VALVE INDIA (P) LTD

e-SCM system

PURCHASE ORDER PLACEMENT FORM

TO:

Vendor Code

P.O. No P.O. Date

Quotation Ref No

Excise Duty Sales Tax

Packing & Forwarding Charges

| P.O Sl.No | Item Code/Drg No | Item Description/Material Description | Quantity | Rate | Delivery Schedule | |
|--------------|---------------------|---------------------------------------|----------|------|-------------------|----------|
| | | | | | Dly Qty | Dly Date |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

Done

Start | mainproject - Microsoft ... | asp | S Internet Explorer | My Computer | 7:42 AM

Fig 14. Purchase Order Placement Form.

DRESSER VALVE INDIA

File Edit View Favorites Tools Help

Address <D:\asp\PO Placement.asp>

3

If you add other row click [Click](#)

No of Items Total purchase Order Value

Payment Terms Inspection Venue

Pack Method Destination

Certificates Required

Material Test Certificates Conformity Certificate Dimensional Report

If any Other

Special Instructions

Prepared and Verified

For Dresser Valve India

Send [Modify](#)

[Back](#) [Home Page](#)

Done

Start | mainproject - Microsoft ... | asp | S Internet Explorer | My Computer | 7:43 AM

Fig 14a. Purchase Order Placement Form

Status monitoring

It is output of the proposed system. It indicates the status about the component if the company (SCM) entry the part code and part description.

The screenshot shows a web browser window titled "DRESSER VALVE INDIA". The address bar contains "0:\jsp\status.asp". The page content includes the Dresser logo and the text "DRESSER VALVE INDIA (P) LTD". Below this, it says "e-SCM system" and "Status Monitoring". There are three search input fields: "Type the part Code:" with a dropdown menu showing "00-221504002XGM-0000", "Part Description:" with a dropdown menu showing "Bonnet m/c 4" 21K", and "P.O Order number:" with a dropdown menu showing "91.1 02.2487". Below these fields is the text "[OR]". Underneath, there is a "Search Results....." section with "RESULT MODE" and a table with one row. The table has columns for "Sl.No.", "Part Code:", "Part Description:", "Supplier Name :", "P.O Order No:", "Delivery Date:", and "No of quantity ordered:". The table content is mostly blank, with only "Sl.No. 1" visible. The browser's taskbar at the bottom shows "mainproject - Microsoft ..." and "asp" as active windows, and the system clock shows "7:50 AM".

Fig 15. Status Monitoring

Payment details form

It shows about the payment details send to the suppliers and subcontractors. It shown in fig 16.

The screenshot displays a web browser window with the following content:

- Browser title: Payment Details
- Address bar: D:\jsp\PaymentDetails.asp
- Logo: DRESSER
- Company Name: DRESSER VALVE INDIA (P) LTD
- System Name: e-SCM System
- Section: Payment Details
- Vendor Code: [Dropdown menu]
- Outstanding Amount: [Text input field]
- Section: Details
- Entry 1:
 - P.O No: [Text input field]
 - P.O Date: [Text input field]
 - Total Amount: [Text input field]
 - Outstanding Amount: [Text input field]
- Entry 2:
 - P.O No: [Text input field]
 - P.O Date: [Text input field]
 - Total Amount: [Text input field]
 - Outstanding Amount: [Text input field]
- Buttons: [Send] [Modify]
- Footer: [Back to Home Page]

Fig 16. Payment Details

Receipt of Materials

It indicates the materials received from the suppliers and subcontractors and also quantity of acceptance to be indicated through mail. It shown in fig 17.

Receipt Of Materials

File Edit View Favorites Tools Help

Back Stop Refresh Home Search Favorites Media

Address D:\asp\ReceiptOfMaterials.asp



Dresser Valve India (p) Ltd

e-SCM system

Receipt Of Materials

Vendor Code

Entry 1

Delivery Chelan No

P.O Order No Delivery Date

Part Code Part Description

No Of Quantity Ordered No Of Qty Received

Acceptance Quantity

Rejection Quantity Rework Qty

Unit Price

Send Modify Back to Home Page

Done

Start mainproject - Microsoft ... asp 9 Internet Explorer My Computer 7:46 AM

Fig 17. Receipt of Material

VALIDATION OF THE SYSTEM

10. VALIDATION OF THE SYSTEM

10.1 SYSTEM TESTING

A strategy for software validation integrates software test case design methods into well-planned series of steps that result in the successful construction of software. A software validation strategy should be flexible enough to promote the creativity and customization that are necessary to adequately test all large software based system. It should also promote reasonable planning and management tracking as the project progresses.

10.2 VALIDATION STRATEGIES

There are two general strategies for validating software. This section examines both the strategies of code testing and specification testing.

10.2.1 Code testing

The code testing strategy examines the logic of the program. For this testing method, the analyst develops test cases that result in executing every instruction in the program or module, that is, every path through the program is tested.

The path is a specific combination of conditions that is handled by the program. The testing of every path in the program is not always possible as there could be several thousands, and financial and time limitations will not this. Generally, all the frequently used paths undergo testing.

10.2.2 Specification testing

To perform specification testing the analyst examines the program specification wherein states what the program should do and how it should perform under various conditions. Then test cases are developed for each condition or combination of conditions and submitted for processing.

By examining the results the analyst can determine whether the program performs according to its specified requirements. This testing does not look into the program to study the code or path, it looks at the program as a whole, the assumption here is that, if the program meets the specification it will not fail.

10.3 SOURCES OF TEST DATA

There are two different sources of test data;

- ⊙ Live
- ⊙ Artificial

10.3.1 Live Data

These test data are those that are actually extracted from organization files. This will show us the system performance on typical data.

10.3.2 Artificial Data

These test data are solely for test purposes. They are to be generated to test all combination of formats and values.

10.4 LEVEL OF TESTING

10.4.1 Unit testing

This involves the tests carried out on modules/programs, which make up the system. This is also called as program testing. The units in a system are the modules and routines that are assembled and integrated to perform a specific function. In a large system, many modules at different levels are needed. Unit testing focuses first on the modules, independently of one another, to locate errors. In this system individual screens that were tested. Each and every data was given and tested. The various forms like problem declaration form, purchase order placement form, payment details form etc. were tested.

10.4.2 System testing

When unit test are satisfactorily concluded the system, as complete entity must be tested. There are three types of system testing. They are

- ❖ **Security testing**
It attempts to verify the protection mechanisms built in to a system. This will protect the system from improper penetration.
- ❖ **Stress testing**
It executes a system in a manner that demands resources in abnormal quantity, frequency or volume.
- ❖ **Performance testing**
It is used to test the performance of software within the context of an integrated system.

RESULTS & DISCUSSIONS

11. RESULTS AND DISCUSSIONS

In today's world, Supply Chain Management plays major role in maintaining good relationship between suppliers, subcontractors and customers. This project aims at exchange of communications between supplier and subcontractor via internet. This enables fast and clear transactions, up to date information and status monitoring. In general following are the benefits from the e-SCM system to the company.

- Follow up Chain is reduced.
- Delay can be minimized.
- Reduces the transport cost.
- Time Compression.
- Reducing cycle time.
- Reducing the number of suppliers.
- Improve delivery commitments.
- Proper information an quantity acceptance & payment details.
- Storing of informations in database for speedy retrieval.
- Eliminating the role of intermediary members.
- Tracking and tracing of the materials and progress of work in any segment of the supply chain will be fast and complete.
- Time for information flow is reduced as also speculation in the system.
- Fresh and additional information can be intimated to all suppliers and subcontractors effectively and immediately.
- There is quicker response as there is real time customer service.
- It eliminates clerical activity and thus reduces costs.

Even though the system is suitable for present environment in the company, some limitations can be identified and which can be eliminated in the future.

Manmade inaccuracy

Sometimes the person in the system cannot know about the system and other facilities. It makes faulty and inaccurate information via in the system

Ineffective coordination between of the suppliers/subcontractor

The coordination between the suppliers and subcontractors is important in this system for communicating the message through the members of the chain.

Technical problems like server breakdowns in the network

Technical problem like the server breakdown in the network affect the up-to-date information sources.

Insufficient data supplies or data not up to date

Data entry in the system are insufficient that cannot allow for up to-date information and also insufficient data stored in the database.

Human inefficiency in handling and delivery of product levels.

Whatever the information passing through the net, inefficiency of handling and delivery of products by human in all the levels affects the system.

Ignoring impact of uncertainties

Ignoring the information passed by phone, that not be stored in the database.

12. CONCLUSION

Every organization is looking at redefining itself into an e-business or at least developing an e-business strategy. IT is redefining the way societies are constructed, functions and grows all over the world. The internet provides a great opportunity to automate the supply chain and provide organizations with real time information across various points in their value chain. It guarantees redirect in cost and improves the chain performance.

This project examines internal and external supply chain links for the purpose of better information flow via internet enabled strategy.. The links are

- company to suppliers
- company to subcontractor
- subcontractors to suppliers.

From these links company gets benefits to trace the product processing information via internet. Status monitoring is made easier and up to date. This strategy is more effective than the existing system, and it has already begun to change the way companies interact with their suppliers, subcontractors and customers via internet.

This project that helps managers deal with competition have immensely benefited by supply chain management. The implementation of an Web centric strategy for supply chain management system, calls for detailed analysis of the activities, determination of requirement, identification of planning and execution.

Rightly implemented, the concept will go a long way in saving costs and adding value for the organization. This project harnessing IT for managing supply chain, and could be a tool for sustaining, growth and economic significance of a business.

There is always scope for improvement in any project. This project also has scope for improvement.

Future Improvement

SCM has moved into the spotlight as companies turn from streamlining internal operations to improving the exchanges that occur between trading partners, either inside or outside the organization. Companies across the world are implementing enterprise resource planning and are aiming to make all operations-from production to delivery to the customer-smoother, more efficient and linked.

However, ERP systems alone do not deliver what companies need to survive and thrive in today's marketplace. Leveraging ERP systems to the internet, forging good supply chain relationship and customization of products and services are essential to future success in business. To make this project in further improvements company has to

- ✦ Link with ERP systems in the company
- ✦ SCM via Internet through customer known- Existing customers as well as new customers should given orientation about adopting this system in the network.
- ✦ Expert system techniques would be adopted for better supply chain performance automatically.
- ✦ Creating various tools for user friendly in the system.
- ✦ Mobile wireless supply chain model.

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APPENDIX

APPENDIX A

- SCM - Supply Chain Management.
- CRM - Customer Relationship Management.
- HTML - Hyper Text Markup Language.
- HTTP - Hyper Text Transfer Protocols.
- URL - Uniform Resource Locator.
- WWW - World Wide Web
- HOD - Head of the Department
- e-SCM - Electronic- Supply Chain Management.