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ERP for Textiles and Apparel Industry

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and
K. J. Vishnu Vardhini

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Foreword

It gives me immense satisfaction to write the foreword for this book, not because I have known the authors of this book for more than five years. It is because this book contains in depth information about how ERP can be effectively utilized by textile and apparel industries. It talks about the technology and functionality of ERP. It will serve as a guide for the industry personnel and also as a source of knowledge to the students. I congratulate the authors for their good work.

This book shows Mr. Surjit's in-depth knowledge on ERP implementation that he had acquired during his stint with reputed ERP implementation companies. The book's co-author Mr.R.Rathinamoorthy's knowledge on the management of textile and apparel domain comes to fore in this book. I am sure that the other co-author Mrs.K.J.Vishnu Vardhini's experience in ERP implementation also has come in handy in writing this book. Her exemplary skills on ERP implementation are showcased in various chapters.

The special aspect of the book is that it provides a step by step process of how ERP software can be implemented in a textile and apparel industry. It guides on the evaluation and the selection process of ERP. The book also highlights the career opportunities for the textile and apparel graduates in ERP. There are lots of case studies which will surely make the understanding of readers better.

I am sure this book will be found useful by the students, academicians and industry personnel. I take this opportunity to wish the authors the very best, and I look forward for many more such comprehensive books in future.



Dr. Prakash Vasudevan

Preface

This book has been written to address the specific needs of students, academicians and industry personnel on using ERP software for textiles and apparel vertical. Many books have been written on ERP, its technology, functioning, etc. but there are no books available specific to ERP functioning and usage in the textile vertical. This void gave us impetus to write a book on ERP catering exclusively for textiles and apparel vertical.

The book has detailed information on how ERP can be effectively used in textile and apparel industries. The implementation process of ERP is detailed. It would serve as a step by step guide for industries to evaluate and select the right ERP for textile and apparel industry. Success of ERP is based on top management support and employees mindset to change for the betterment of the company. This book addresses both the aspects. There are detailed illustrations provided to give a better idea for the readers on various transactions and reports used in ERP. The latest developments in ERP are discussed.

We have written this book based on our experience in implementing ERP for textile and apparel industries. So we have highlighted the various issues faced during implementation and how it can be overcome with proper planning and support from all stakeholders. It may be difficult for a reader to immediately start working on ERP software after reading this book but it will surely provide them knowledge on how they can use it effectively for better results.

Another reason for us to come up with this work was that the major corporations of textile and apparel are now looking for students to possess knowledge on ERP software before they join their companies. This book would serve that purpose as students will know about various modules, reports, implementation process, etc. It will be easy for the academicians to teach the students about textile and apparel industry specific practices in ERP using this book. We have also provided a chapter to discuss the various career opportunities in ERP for experienced and fresh graduates.

We are sure that this book would be the first step in enriching knowledge to the readers on ERP for textiles and apparel industry and we are confident that we have addressed a niche segment named ERP with this book which is the buzz word in all textile and apparel industries including large scale corporations, SME's and small scale enterprises also. We acknowledge and thank all the people who have provided support for writing this book.

R.Surjit
R.Rathinamoorthy
K.J.Vishnu Vardhini

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Enterprise resource planning (ERP): an overview

This chapter gives an overview of enterprise resource planning (ERP). The chapter explains how ERP has evolved from business process reengineering (BPR), material requirement planning (MRP), manufacturing resource planning (MRP II), and decision support systems (DSS). The basics of ERP, its growth, the needs for it, and the benefits of using it are elaborately discussed in this chapter. The chapter also explains the life cycle of ERP. It details the various phases in ERP, starting from decision to investing in ERP to implementation. It gives details about the various vendors of ERP and the business verticals to which they cater.

Keywords: ERP, ERP life cycle, BPR, MRP, MRP II, TSS, DSS, SCM

1.1 Introduction to enterprise resource planning (ERP)

ERP is the acronym for enterprise resource planning. ERP is a software application that encompasses all the data related to a company and aids the company in providing information at the right time. ERP originated in as early as 1960s and has gained overall acceptance in the past two decades among the industries. ERP has been defined in many literatures and few of those definitions are given below to gain a better understanding of ERP before looking at the evolution of ERP.

Enterprise resource planning (ERP) is business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources.

(Webopedia)

A more generic definition of ERP given by Margaret Rose is as given below:

ERP (enterprise resource planning) is an industry term for the broad set of activities that helps a business manage the important parts of its business.

Enterprise resource planning (ERP) is business management software—typically a suite of integrated applications—that a company can use to collect, store, manage and interpret data from many business activities, including product planning, cost, manufacturing or service delivery, marketing and sales, inventory management, shipping and payment.

(Wikipedia)

A method for the effective planning and controlling of all the resources needed to take, make, ship and account for customer orders in a manufacturing, distribution or service company.

(American Production and Inventory Control Society, 2001)

A process by which a company (often a manufacturer) manages and integrates the important parts of its business. An ERP management information system integrates areas such as planning, purchasing, inventory, sales, marketing, finance, human resources, etc.

(Investopedia)

One database, one application and a unified interface across the entire enterprise.

(Tadger, 1998)

ERP is an enterprise-wide information system that integrates and controls all the business processes in the entire organization. The Enterprise Resource Planning (ERP) system is an enterprise information system designed to integrate and optimize the business processes and transactions in a corporation.

(Shahneel Baray et al., 2006.)

ERP software is a set of customizable and highly integrative real-time business application software modules sharing a common database, which support core business, production and administrative functions, such as logistics, manufacturing, sales, distribution, finance and accounting.

(Stefanou, 2000)

ERP systems are integrated enterprise-wide software packages that use a modular structure to support a broad spectrum of key operational areas of the organization.

(Adam, 2000)

All the above definitions cover an exhaustive list of what ERP does in an industry and let us now decipher them. ERP gathers information of all the activities in a company

- ERP is an integrated application that has access to and stores information on all the departments and business processes in a company
- ERP is a customizable application software
- ERP encompasses many modules, and these modules are specific and applicable to various departments and capture their activities
- ERP captures all the transactions that take place in a company
- ERP helps optimize the business

- ERP can be used in real time for taking business decisions
- ERP helps in planning and controlling the business
- ERP supports all the activities and business processes of a company
- ERP contains a common database which captures and stores all the data

Based on the above details, it can be seen that ERP is a software application that helps in running a business by capturing, storing, and providing information to all the stakeholders of the company. In other words, it supports the company run its business.

A common misconception that many industries have about ERP is that it will manage the business on its own. However, it is a totally wrong understanding of ERP and its functional capabilities; for example, there is a quality analysis report of a product obtained from a machine that shows deviations from the quality standards and specifications set for the product and the report makes it clear that deviations are a result of the error caused by the machine operator. In such cases, some of the managers expect ERP to take action against the machinist for not performing with the expected accuracy. However, there is nothing that ERP can do in this case. It is only a supporting tool for the manager. It will give information to the manager that a mistake has occurred and corrective action has to be taken by the concerned manager. It is imperative to state here that ERP is not a robot and it only aids the business activities of a company. It will perform the functions based on how it is programmed, such as highlighting deviations, running analysis reports, and giving reasons for mistakes/deviations. Thus, ERP is actually an information and analysis tool rather than a control tool. The control always remains with the manager.

1.2 Evolution of ERP

Even though the concept of ERP dates back to 1960s, the term ERP was coined by Gartner in 1990. ERP was meant to be a replacement of a range of piecemeal software applications designed in relation to specific activities of different departments. For example, before the advent of ERP, the stores department of a company had its own software developed based on COBOL or FORTRAN. Accounts department had accounting systems like TALLY, which dealt basically with the accounts/bookkeeping activities of the company. Similarly, HR team had a different software application. Hence, in the pre-ERP times, having different individual software applications catering only to specific departments and such applications not necessarily operating simultaneously did make it difficult for the management to obtain information needed on time to help with decision-making. ERP has replaced all these

legacy systems by absorbing all of them into its scope, thereby aiding the business immensely.

The evolution of ERP has been a tremendous breakthrough in the integration of information technology with all other allied disciplines. The various systems that were later integrated with the advent of ERP include the following: management information system (MIS), integrated information system (IIS), executive information system (EIS), corporate information system (CIS), enterprise-wide system (EWS), material requirement planning (MRP), manufacturing resource planning (MRP II), decision support systems (DSS), capacity requirement planning (CRP), distribution requirement planning (DRP), and transaction support systems (TSS).

In their individual capacity, all the above systems had some shortcomings; for example, they did not cater to all kinds of industries, there was no integration between the departments, and there were separate systems for separate functions. All these demerits were overcome by the then-new concept of ERP. It is said that ERP is a part of the business process re-engineering (BPR) of a company; however, some scholars who did not agree with this view state that ERP came into existence way before BPR gained popularity. However, let us first try to understand the concept of BPR to come to a conclusion in this regard.

1.2.1 Concept of BPR

BPR is the acronym for business process reengineering. BPR is the analysis and redesign of workflows within and between enterprises in order to optimize end-to-end processes and automate non-value-added tasks. A famous website, investopedia, states that BPR is the complete overhaul of a key business process with the objective of achieving a quantum jump in performance measures such as return on investment, cost reduction, and quality of service. Business processes that can be redesigned encompass the complete range of critical processes, from manufacturing and production to sales and customer service. BPR concept was outlined in the *Harvard Business Review* article in 1990 by Michael Hammer. This was around the same time when Gartner coined the term ERP.

BPR can be better understood with an example. Automobile manufacturing companies had various ways and means to dispose waste using methodologies that were in existence for decades. However, there was always a need for a better manufacturing system that can control the waste. It was that time when Toyota came up with a new production system that later came to be known as lean manufacturing. This concept is being applied even to apparel industry to reduce the waste. Thus lean manufacturing concept is an example of BPR. The

waste control process is also done in a different way. A new radical approach is followed in manufacturing to control waste. Concepts like “Six Sigma” that are advocated to reduce the number of defects and accurate response (AR) to classify predictable and unpredictable demands are all examples of BPR. BPR means following a completely new way of doing business deviating from existing systems and processes. It is the process of devising new ways of making a product or, for that matter, devising a new process for carrying out an activity so that we get a new, more efficient process that cut costs and saves time. Therefore, if reference is made to ERP in this context, ERP can be viewed as an integral part of BPR. The earlier way of gathering information was using ledgers and island of software. However, after the advent of ERP, the process is quite simple; all the data are gathered and maintained in a single database for the usage of all stakeholders. Hence, ERP is a new way of managing the process of data gathering and information processing. Although the terms ERP and BPR were coined by different people, it can still be rightly said that BPR concept encompasses ERP.

1.2.2 ERP Evolution timeline

The evolution timeline of ERP is provided in the Table 1.1. The timeline of ERP is provided above to gain a better understanding of how ERP has evolved over the years. It is expected that in 2020, more focus on business intelligence will be the key and mobility will be expected so that everyone in the company will be able to access ERP whenever needed using mobile devices and take necessary actions using the reports from ERP. The evolution of ERP is summarized based on decade-wise transformational developments (see [Table 1.2](#)).

Table 1.1 The evolution timeline of ERP

Year	Development in ERP
1960	ERP was born. Tractor manufacturer J I Case with IBM made a joint effort and material requirement planning (MRP) came into existence
1970	MRP systems were proving to be very difficult to manage due to requirement of huge technical staff for taking care of the computer systems
1972	SAP was started in Germany by five engineers to create a software for integrating business activities of a entire company
1975	Lawson Software was founded based on the thought that industries need a complete packaged enterprise technology solutions instead of individual island software packages that were used in different departments
1976	MRP became the fundamental concept to be used in production management and control
1979	Oracle, founded in 1977, came out with the first commercial SQL relational database management system (RDBMS)

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1980	MRP evolved into MRP II (manufacturing resources planning), which was considered to be a better replacement for MRP as it helped with planning all the resources for manufacturing, including material
1982	BAAN, a leading ERP software vendor, came up with its first software product
1983	VAX model database, a database completely written in C, was developed and released by Oracle
1985	JD Edwards (software company) became the pioneer supplier by providing application software for the IBM AS/400 computer, which was very successful at that point in time
1987-88	PeopleSoft was founded and it came up with a Human resource management system for the industries
1990	The term ERP was coined by Gartner and MRP II was extended to cover finance, human resources, engineering, and product management. BAAN software was marketed in 35 countries
1991	ERP usage increased rapidly and PeopleSoft set up offices in Canada and made its presence in all the continents across the globe. Desktop-based applications were making a huge presence and internet-enabled ERP systems were not there
1995	BAAN grew in its business and gained around 1,800 customers worldwide and had more than 1,000 employees
1999	JD Edwards had more than 4,700 customers in over 100 countries. SAP became the world's largest inter-enterprise software company and the world's fourth largest independent software supplier overall. SAP has a workforce of over 20,500 people with operations in more than 50 countries.
2000	The term ERP II or Extended ERP was coined by Gartner, which was created to project how ERP vendors will respond to market challenges by 2005
2001	Demand for ERP systems dropped due to 9/11 attack in USA
2002	ERP systems were developed to become internet-enabled so that they can be accessed from anywhere in the world by all stakeholders, such as managers, owners, suppliers, and so on.
2004	Service-oriented architecture (SOA) was developed so that an interface was created between different systems for better information sharing
2005	Industry consolidation happened and new players came up in the market
2008	Open source technology came into existence where customers were able to customize ERP using their IT team, and cloud computing usage in ERP was evident. Cloud computing is used for sharing of resources to achieve economies of scale and it will be discussed later.
2010	SAAS (Software as a Service) and PAAS (Platform as a Service), which are parts of cloud computing, started gaining importance. Small businesses started using ERP. Mobile ERP gained importance. Role of ERP in supply chain management (SCM) functions was better understood and ERP became a part of SCM activity
2012	Realignment of ERP systems—companies that implemented ERP a decade back started revamping their systems
2014	Two-tier ERP came into existence where Oracle or SAP is used as a primary system and other systems were used for Tier 2. Cloud ERP gained better ground. Social ERP—adding social media packages to ERP was created. Most important breakthrough was establishing a direct linkage by integrating machine and ERP database thereby skipping the bar codes for finding out consumptions, completions, and labor updates.
2015-present	ERP became a part of larger entities. Demands are increasing for software integration with business intelligence (BI), customer relationship management (CRM), market research (MR), product life cycle management (PLM), retail analytics and so on.

Table 1.2 Decade-wise Evolution of ERP

Decade	Concept	Function
1960s	Inventory control packages	Managing inventory
1970s	Material requirement planning (MRP)	Planning the materials required for executing an order
1980s	Manufacturing resource planning (MRP II)	Involved material and capacity planning
1990s	Enterprise resource planning (ERP)	Process integration and centralized information gathering and access developed
2000s	Extended ERP (ERP II)	Optimizing enterprise and inter-enterprise, collaborative-operational and financial processes
2010s	ERP II, cloud computing, mobile ERP, part of SCM activity, integration with BI, PLM, retail analytics, and so on.	Accessing ERP on a shared platform optimizing the resources and integrating it with business intelligence, product life cycle management, retail analytics, and so on for improved business outcomes. ERP is required for managing supply chains effectively

In the evolution of ERP, many concepts had emerged: MRP, MRP II, and SCM. These concepts will be discussed further so that a better understanding of ERP can be achieved before proceeding to discuss the benefits and life cycle of ERP.

1.2.3 MRP and MRPII

MRP's existence dates back to 1970s. It replaced the inventory control packages that were in existence. MRP is a computer-based information system designed to order and schedule "DEPENDENT" demand inventories (raw materials, component parts, and subassemblies) in a coordinated manner. It ensures that enough stock is always available for use. Two problems associated with it were setting up schedules, keeping track of orders and coping with changes and high quantities of inventory versus excessive stock-outs. Its main purpose was to control inventory levels and assign operating priorities for ordered items.

Figure 1.1 shows the inputs and outputs of MRP. The materials available, order details, material requirement in terms of bill of materials (BOM – bill of materials is the list of raw materials, subassemblies, subcomponents, parts, and quantities of each needed to manufacture an end-product), and master production schedule are fed into the system and then system gives the primary orders report, action report, and pegging report (shows relationship between demand and supply) that are used as the base for MRP. The master production schedule (MPS) consists of demand data, inventory status, planning data, production plan, and rough-cut capacity planning. MPS states which end items are needed in what quantities, on what specific dates, and when they will be produced. Rough-cut capacity planning determines capacity requirements to implement MPS; it verifies schedule's viability or makes changes to master schedules which in turn leads to revision in production schedule. These details

are used for planning material requirement and production. MRP was run using mainframe computers and these computer systems required a large number of technical staff leading to unnecessary complexity in the process. Furthermore, in MRP, other relevant processes were not considered; for example, operations were not linked with finance, accounting, and marketing activities. So there was a need for a system that included all the relevant processes in its scope, and hence, MRP II came into existence in 1970s.

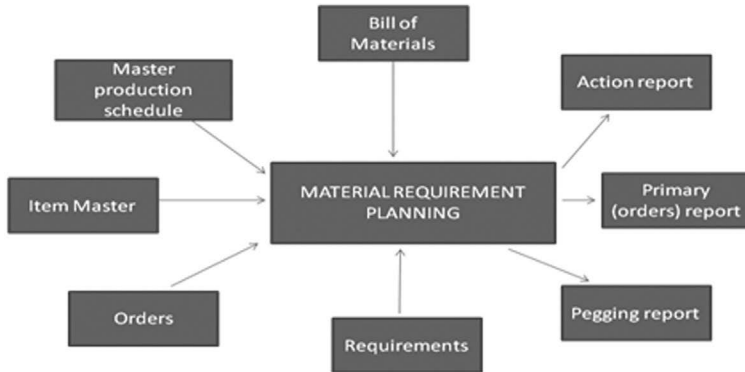


Figure 1.1 Materials Requirement Planning Inputs and Outputs

MRP II is a concept that tries to incorporate other relevant activities of the company into the production planning process. MRP is a production planning system that converts an MPS into planned order releases. In MRP, MPS is just an input function, whereas in MRP II, MPS is considered an integral part of system and, thus, considered a decision variable. So the main difference between MRP and MRP II is MPS is an input variable in MRP, whereas it is a decision variable in MRP II. In addition, MRP II links financial, accounting, and marketing functions with operations. Some other salient points of MRP II include the following:

- MRP II incorporates capacity requirement planning (CRP)
- MRP II is a closed-loop cycle
- MRP II converts information from MRP into specific schedules for departments and machines, evaluate department workloads, and produces management report on production and financial performance.
- It has a feedback mechanism; so if there is excess machine capacity or manpower, then MRP and corresponding production schedules are revised to stay within capacity limits.

MRP II concentrated on resources planning and involved other departments; however, it was not able to integrate all the activities of the company and as a

result arose the requirement for an integrated system, and the efforts to develop such a system led to the creation of ERP. In addition to MRP, MRP II, there were many other allied information systems as mentioned earlier, such as DSS and TSS. In what follows, a brief outline of MIS, DSS, and TSS is provided.

1.2.4 MIS, EIS, DSS, and TSS

MIS is the base for DSS. MIS produces fixed, regularly scheduled reports based on data extracted and summarized from the firm's underlying transaction-processing systems to middle- and operational-level managers to identify and inform structured and semi-structured decision problems. Executive information system (EIS) is a reporting tool that provides all the necessary reports for the executives of the company that are required for taking decisions related to all the activities of the company. DSS is used by middle and higher management. These are computer program applications that compile information from a wide range of sources to support problem solving and decision making. Semi-structured and unstructured decision problems can be handled by DSS. TSS became operational in 1960. It was introduced by SABRE. It is a system that divides work into individual, undividable operations called transactions. These TSSs are used in large banks, credit card companies, and hotels.

All these systems give varied information and aid the managers in decision making. However, these systems work in isolation many times, and this isolation creates a niche and then came ERP to fill it. In most cases ERP encompasses all these activities as one integrated system in order to handle all transactions, data and providing meaningful reports to end-user. It was not only integration that gave rise to such a growth of ERP. ERP played and is playing a major role in supply chain management (SCM); in fact, it is one of the prime reasons for ERP's huge success.

1.2.5 Supply chain management (SCM)

SCM can be defined as the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers.

(Harland, 1996)

It ensures that a product or service is available at the right time, right place, right quality, and right quantity. SCM involves flow of material, information, and funds in the supply chain. ERP aids in ensuring smooth flow of information, funds, and materials in the supply chain; hence, it became an integral part of SCM. It was easy to gain control of the supply chain and its partners by having proper information on various activities of the supply chain, ERP helped in gathering and providing the information when required. Hence, after SCM gaining greater grounds, ERP has become the buzzword

and led to the development of ERP II, which is based on ERP's roles in SCM, customer relationship management (CRM), product life cycle management (PLM), and so on.

1.3 Basics of ERP

Various definitions were discussed earlier, and to make it easy for understanding what ERP is, the following explanation is provided. ERP is an information system that integrates all facets of business like R&D, sales and marketing, manufacturing, logistics, human resources, logistics, financials, and so on. ERP streamlines workflows, business processes, and methods followed by the organizations to attain the goals envisioned for SCM.

Figure 1.2 gives an idea of what is available in an ERP system. In the ERP system, all the activities of the company are entered, and, based on the details fed, various reports are obtained for analysis. ERP activities encompass MRP II, SCM, human resource management (HRM), customer relationship management (CRM), and financial resource management. New ERP systems even include PLM. ERP helps in complete integration of all the departments of a company. ERPs support multiple languages and a wide variety of industries and can also be used across multiple locations. ERP in textile industry caters to all the verticals like spinning, weaving, knitting, non-woven, technical textiles, dyeing, printing, finishing, home textiles, and trading. It uses a single database like Oracle and SQL server where all the data related to the industry are stored. So there are no multiple storage points, and hence, the data are easily accessible. The basic details about a database and its necessity are discussed in Chapter 2. All the data related to the company are stored at a single location in a computer (server).



Figure 1.2 Enterprise Resource Planning System

ERP system consists of various modules that are nothing but departments such as sales, production, inventory, and procurement. All the activities of a particular department are entered in the respective modules, and based on the data entered, various information, research, and analytical reports can be obtained. For example, once a quotation is approved by a customer, customer sends a purchase order, and based on it, a sales order is made and sent to the customer confirming that the order has been received. The sales order is created using ERP. All the required data for making sales order are entered in the ERP system by the sales or marketing person. After entering all the relevant data such as quantity, quality, cost, delivery details, and customer details, the sales order is submitted, and then a copy of it can be printed out for the concerned manager's signature and approval. The benefits of creating a sales order on ERP are immense. The sales order created can be viewed on-line by the manager, senior management, and also the customer if required. All the other departments of the company will get a message through the ERP system that a sales order has been created. Based on the delivery date, the planning team will start creating the production order and purchase team will initiate purchase of required items and the process continues. So the information is known to everyone concerned, that an order has been received, and subsequent processes are carried out without any delay. It is not just information that is shared as ERP gives rise to various reports. With just sales report creation, we will be able to find out with the click of the button how many sales orders have been received from that customer, how many quotations have been converted into sales, most recent information for the quarter that just ended, including sales, area-wise sales, person-wise sales, monthly sales, marketing personnel's efficiency, and so on. It will also highlight if the sales percentage drops when we have given a standard to be maintained. This helps a manager to track the performance of the company and the persons involved. It will also help the manager to know the status of a particular sales order after it has been initiated, for example, whether that order is in production or dispatch, and it even gives reports on production and dispatch against that sales order within few seconds; all of these features show that ERP is better than the conventional system of record maintenance.

The above example illustrates what ERP is used for in a company. Similar to the above example, all the activities that are carried out in the company, even if it is just purchase of a small nut and screw, are captured and stored in the ERP system. Basically ERP is an information-providing tool that helps in decision making for the managers.

1.4 Needs for and benefits of ERP

The need for ERP is given below. The list provided is not exhaustive since ERP is required for so many reasons:

- ***To integrate all the activities of the company.*** As discussed earlier, having islands of software in each department will lead to delayed information sharing among all stakeholders. So, having an integrated system eliminates all delays and information can be obtained any time by all concerned.
- ***To get real-time information.*** Integrating machine output with ERP will lead to getting the production details in real time as it happens rather than waiting for a day to know yesterday's production. It helps to take decisions in real time. Real-time corrections can be made rather than doing damage control after things go wrong.
- ***To approve or reject any company activity online with immediate action.*** A purchase order can be approved in real time by the owner sitting in any part of the world and need not wait for physical presence for each and every activity of the company.
- ***To increase visibility in the organization by enabling stakeholders' to access the required details immediately.*** The visibility in the organization will increase, thereby helping faster dissemination of information and detailed reports of various analysis to all concerned. A person in dispatch department will know when a particular order is to be shipped and what is the status of that order in production. He would know immediately if there is any delay and need not wait till the moment dispatch becomes due and can know beforehand that the material is not ready for dispatch.
- ***To have better control over organizational resources, including men and material.*** Maintaining control over men and material is difficult; ERP would be very much required because it will help in managing men and material. Detailed analysis reports focusing on workers' efficiency, their output, and comparative analysis between workers' efficiency will give management a better chance to exercise control over workers. Sufficient data will be available to question the workforce if there is an issue. Similarly material availability can be checked immediately using ERP inventory module and also purchase detail can be tracked instantly, which will help with avoiding delays in production due to material shortage.
- ***To know the deviations in quality of a product.*** If there is a chance of products not meeting standards, then ERP would be very much needed. In ERP quality module, standards can be set for each and every test that is carried out. So with automatic data transfer, once a test is carried out, the results are checked by the ERP system to see whether there is any deviation from the standards set. If there is any deviation then the same can be highlighted and conveyed via email or message to the concerned

official for taking immediate action, thereby addressing and arresting quality deviations.

- ***To increase productivity and achieve higher efficiency levels.*** It is essential for increasing productivity and efficiency. Strict monitoring using ERP will lead to increased efficiency and thus increased productivity. Employee monitoring can be done periodically based on the reports obtained from ERP. A detailed analysis done on reports obtained will help a company identify the reasons for low productivity and efficiency. Thus, corrective actions can be taken immediately to increase productivity and efficiency.
- ***To avoid or reduce wastage in processes.*** If processes involve lot of wastage, then by using ERP, various ways and means can be developed to identify and remove chinks in the process that lead to wastage. Reports can be generated that show details of waste generated every day, including in relation to machine, employee, and material, to enable corrective and/or preventive action.
- ***To follow best-practice procedures.*** Many companies might not follow the best practices in the industry and most often because workers resist change and are wary of new technologies. ERP vendors ensure that processes followed using ERP are the best in the industry. So those best practices will be taught to industries during ERP implementation and will lead to industries following state-of-the-art business procedures and processes.
- ***To increase customer satisfaction.*** Accurate response, quick response, efficient consumer responses are few of the customer service techniques. All these techniques can be incorporated in ERP to provide better customer service. On-time delivery with best quality can be achieved using ERP and, thus, increasing customer satisfaction.
- ***To manage and control costs.*** Effective finance controlling can be done using ERP by setting limits of expenditure per person and by assigning appropriate approval authorities. It helps in calculating depreciation and financial ratios accurately, thereby enabling good control over expenditure. It would be very effective when company operates in multiple locations.
- ***To maintain accurate records.*** Manual errors and errors due to incorrect bookkeeping can be avoided as data once entered will be securely stored and any changes can be made only by authorized personnel, which will enhance accuracy of records created.
- ***To get detailed analysis reports.*** If a company requires detailed analysis reports on its functioning, then ERP is the need of the hour

for them. It provides a comprehensive package of various reports of analysis, including analysis reports for overall business growth, payroll, operations, finance, and so on. All this will aid in increasing the effectiveness in the overall functionality and efficiency of the company.

- ***To get reduced lead times.*** As each and every stage of work in progress (WIP) is monitored, it makes the job easy for all the concerned personnel and reduces the lead times by making men, material, and machine readily available whenever they are needed.
- ***To reduce labor work.*** By use of ERP systems, labor work is considerably reduced as there is no need for reporting separately and keeping records in files, ledgers, stock books, and so on, as all the data are fed into the system and are available when needed. Even the number of monitoring staff can be reduced as ERP system will automatically report any deviations to those concerned.
- ***To forecast demand proactively.*** By using demand-forecasting techniques, ERP system can forecast demand correctly. There will be no need for a separate demand-forecasting tool or software if ERP with demand-forecasting functionality is implemented.
- ***To optimize production schedules.*** Optimized planning is possible by using ERP, which leads to optimized production schedules, and delays are avoided. Comprehensive planners are available to plan machine allocation in real time.
- ***To meet delivery deadlines.*** With better monitoring and information availability, meeting delivery deadlines becomes easier when ERP is used and customer satisfaction can be sustained.

Overall, it can be concluded that ERP can be useful for organization of any size, ranging from large-scale companies to small and medium enterprises to make their business grow more visibly and increase profits. Based on the needs and benefits explained here, deducing the benefits of using ERP is very easy. Some benefits of using ERP are listed as follows; this list is not exhaustive, as ERP development work is an on-going activity and time and again new features are added to ERP systems.

- Increased organizational transparency and responsibility
- Accurate and faster access to data for timely decisions
- Improved customer response
- Facilitating strategic planning
- Uniform reporting according to global standards
- Optimized asset/resource utilization

- Increased operational efficiency made possible because of the availability of accurate data
- Real-time communication
- Performance analysis
- Identification of production costs
- Cost of quality can be measured
- “Detailed analytics report can be obtained using ERP
- Calculating WIP values are quick and easy
- Quality of a product can be checked immediately if entered in ERP system
- Maintaining stock is easy”
- Transferring stock across multiple units becomes easier
- Preparing quotations and sales orders is easy particularly for repeat orders
- Easy management of workflow in all processes
- Approval of any activity can be obtained quickly and easily
- Production reports can be obtained immediately
- Employee efficiency and machine utilization can be calculated easily
- Payroll analytics, compensation analytics, and performance based incentive systems can all be incorporated using analysis reports obtained from ERP
- Preparation of financial reports at the year end is easier

As indicated previously, benefits to using ERP are manifold and can grow further when users experience good results with using ERP.

1.5 Vendors of ERP

ERP’s growth can be attributed to the vendors of ERP. It is because of their tremendous expertise and knowledge, the ERP market has grown to this level. It is their new concepts that emerge from time to time that take business and ERP to advanced levels. Developments in ERP have been immense since inception. ERP was used through very big mainframe computers in early stages, but now ERP can be used even in a pocket-size mobile, thanks to the enormous research and development work of ERP vendors who consistently keep developing world-class ERP software solutions.

Some reputed ERP vendors are as follows:

SAP, Oracle, Microsoft dynamics, Epicor, Infor, CDC Software, Comcash ERP, CresCloud, Edible Software, Evosys, Godesys, IFS, Lawson, NetSuite, Odoo, Peoplesoft, Plex Systems, Produce Pro, QAD, Sage, SYSPRO, and Tyler Technologies, and Unit4. ERP vendors can be classified on the basis of their functional expertise and industry expertise. A comprehensive list of vendors is provided below based on the expertise.

1.5.1 Classification based on functional expertise

SAP, Lawson, Microsoft, Oracle, Pronto Software, and Sage have functional capability in process manufacturing software, discrete manufacturing software, distribution software, retail software, and service software. CDC and Syspro have expertise in process manufacturing software, discrete manufacturing software, and distribution software. Epicor has expertise in all software except for process manufacturing software, whereas Consona has expertise only in discrete manufacturing software. Ramco system has expertise in all software except for distribution and retail software. IFS has expertise in all software barring retail. IBS specializes in developing discrete manufacturing and distribution software. QAD is proficient in process manufacturing and discrete manufacturing software.

1.5.2 Classification based on industry expertise

SAP and Oracle are the only two companies that cater to all industries, including for aerospace and defense, agricultural, apparel and fashion, building products, chemical products, consumer packaged goods (CPG), construction, contract manufacturing, engineering, financial services, food and beverage, government, high-tech electronics and electrical components, industrial equipment and machinery, industrial products, medical devices, medical supplies, nonprofit pharmaceuticals, paper and packaging, plastics, professional services, real estate, retail, telecommunications, utilities and energy, and wholesale distribution of durable and nondurable goods. Microsoft is not into industrial products, aerospace and defense, utilities and energy, agriculture, building products, and construction. Epicor is not into agriculture, apparel and fashion, building products, construction, engineering, food and beverage, industrial products, paper and packaging, real estate, telecommunications, and utilities and energy. Infor is not dealing with agriculture, contract manufacturing, engineering, medical devices, medical supplies, professional services, real estate, utilities and energy, and wholesale distribution of nondurable goods.

SAP, Oracle, Microsoft Dynamics, Infor, Sage, Exilant, Ramco, Intex, Datatex, Kalsoft, and Axon are some of the vendors who deal with textile, apparel and fashion; we will discuss their capabilities in further chapters.

1.5.3 Tier classification

ERP vendors are classified based on tiers. Tier 1 ERP vendors are SAP, Microsoft, and Oracle. They are more versatile than any other ERP solution providers in the market. They are used in large-scale companies with multiple locations and complex business operations. Tier 2 ERP vendors are less complex and are used by medium-scale enterprises, whereas Tier 3 vendors are chosen by small and medium enterprises that have simple functional requirements. Some of the Tier 2 vendors include CDC Software, Deacom, Epicor, Infor, Ramco, QAD, Netsuite, and so on. Examples of Tier 3 vendors include Retalix, Seradex, American Software, Appian Corporation, and so on. There are also cloud-based vendors like Acumatica and Intacct Corporation. Ancillary ERP vendors are ideal for one particular business function within an organization.

1.5.4 Market share of ERP vendors

The major ERP vendors are mentioned in the 2015 ERP research report of Panorama Consulting Solutions (Figure 1.3). The report gives details of most frequently short-listed vendors. In this list SAP is at the top with a market share of 27% followed by Oracle at 19%. Microsoft is at the third place with a 13% market share, and the fourth place is shared by Epicor and Infor having equal market share at 4%.

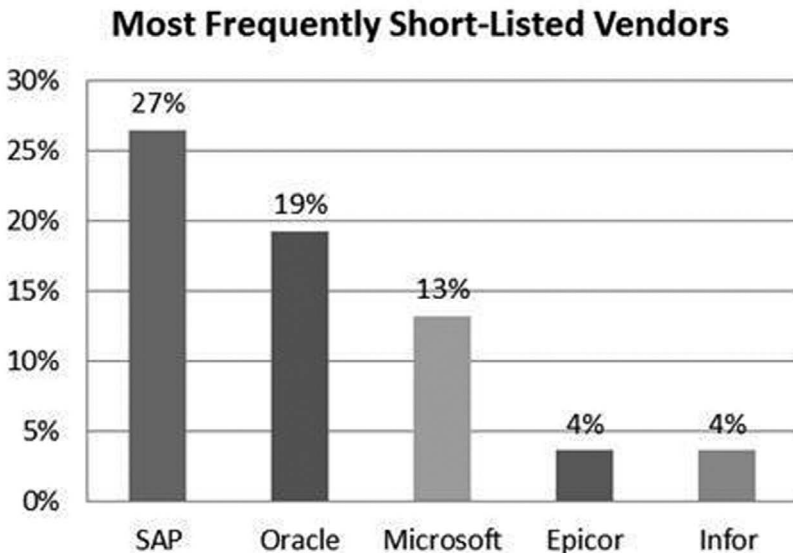


Figure 1.3 ERP Vendors' Selection Percentage
(Source: www.panorama-consulting.com)

After ranking based on shortlists, report shows that SAP is also the most frequently selected vendor with 39% selection rate followed by Microsoft Dynamics at 27%. Oracle is at the third place with 26% selection rate and Epicor is at the fourth place with 6% selection rate. The report further shows that SAP has gained a large market share over the last year in comparison to Microsoft and Oracle. All other ERP vendors fight for the remaining 2% market share; this indicates the competitiveness among ERP vendors who compete fiercely to provide better products and services and sustain customer satisfaction.

A comparison between major ERP vendors such as SAP, Oracle, and Microsoft based on select attributes is shown in Table 1.3.

Table 1.3 ERP Tier I Vendors' Comparison (Source: www.panorama-consulting.com)

Attributes	SAP	Oracle	Microsoft
Market share	24%	18%	11%
Rates of being short-listed	38%	32%	24%
Selection rates when short-listed	19%	22%	14%
Satisfaction rates	39%	80%	33%
Implementation duration	13 months	11 months	14 months
Percentage of customers who realize payback within one to three years	57%	51%	74%
Percentage of customers who realized payback in less than three years	69%	60%	84%
Delta between planned project costs and actual project costs	8% (\$19 million planned vs. \$20.6 million actual)	15% (\$1.4 million planned vs. \$1.6 million actual)	14% (\$408,000 planned vs. \$464,000 actual)
Percentage of customers who realized less than 60% of anticipated business benefits	67%	63%	76%
Percentage of customers who realized more than 60% of anticipated business benefits	33%	37%	24%

SAP (systems, applications and products in data processing). SAP is a German multinational software corporation that makes enterprise software to manage business operations and customer relations. SAP is headquartered in Walldorf, Baden-Württemberg, Germany. It has more than 291,000 customers located in as many as 190 countries. It is a world leader in enterprise applications in terms of software and software-related service revenue. Based on market capitalization, they are the world's third largest independent software manufacturer. They have more than 74,500 employees with operations in more than 130 countries and have a 43-year

history of innovation and growth, which essentially makes them a true industry leader. Annual revenue (IFRS) of SAP is €17.56 billion. They are listed under the symbol “SAP” on stock exchanges, including the Frankfurt Exchange and NYSE. The software packages of SAP are SAP Business One, SAP Business ByDesign, and SAP Business All-in-One. They use a programming language called ABAP and are the pioneers in ERP around the world.

Oracle. Oracle enables its customers—400,000 of them in more than 145 countries around the world—to accelerate innovation and create added value for their customers. Oracle’s E-Business Suite (also known as Applications/Apps or EB-Suite/EBS) consists of a collection of ERP, CRM, and SCM computer applications either developed or acquired by Oracle. The software utilizes Oracle’s core Oracle relational database management system technology. The E-Business Suite contains several product lines. The various ERP packages of Oracle are Oracle Fusion Applications, Oracle E-Business Suite, PeopleSoft Enterprise, Siebel, JD Edwards EnterpriseOne, JD Edwards World, Hyperion Financial Performance Management, and Primavera Enterprise Project Portfolio Management.

Microsoft Business Solutions. Microsoft Dynamics ERP is an ERP software catering to midsize organizations as well as business units of larger organizations. Its applications are a part of Microsoft Dynamics, a line of business management software owned and developed by Microsoft. Microsoft Dynamics applications are delivered through a network of reselling partners who provide specialized services. The various ERP packages of Microsoft are Dynamics AX, Dynamics CRM, Dynamics GP, Dynamics NAV, Dynamics POS, Dynamics RMS, and Dynamics SL.

Epicor Software Corporation. Epicor has been a major player in the Asian business software market for well over a decade. With 17 offices across Asia Pacific and 11 in Asia, the Epicor team consists of over 300 people deployed throughout Asia Pacific and serves more than 1,500 customers. Their business software is available in over 30 different languages, allowing Epicor to support any organization. ERP is designed for the unique needs of the manufacturing, distribution, and service industries, Epicor provides end-to-end solutions coupled with the technology expertise that is required to increase operational efficiency and drive competitive advantage. The various ERP packages of Epicor are Epicor 9, Epicor Vantage, Epicor Enterprise, Epicor iScala, Epicor Retail (CRS+NSB), Epicor Vista, Epicor ITSM, Epicor Clientele, Epicor Avente, Epicor DataFlo, Epicor Manage 2000, and Epicor ManFact.

Infor. Infor is a private establishment with its headquarters in New York. They are specialized in enterprise software for financial systems planning, CRM,

and supply chain. Infor offers customers the benefits of a global company with local presence and experience. It has 73,000 customers with 153 direct offices in 40 countries. It has implementations and support capabilities in over 194 countries. The various ERP packages provided by Infor are Infor ERP A+, Infor ERP Adage, Infor ERP Baan, Infor ERP CAS, Infor ERP COM, Infor ERP FACTS, Infor ERP KBM, Infor ERP LN, Infor ERP LX, Infor ERP MANMAN, Infor ERP MK, Infor ERP PRISM, Infor ERP PRMS, Infor ERP Protean, Infor ERP SyteLine, Infor ERP SX.enterprise, Infor ERP System21, Infor ERP TRANS4M, Infor ERP VISUAL, Infor ERP XA, Infor ERP Xpert, and so on.

1.6 Growth of ERP

The evolution of ERP clearly indicates the growth that ERP has achieved over the years. Based on the data available from 2013, it can be seen that ERP’s market grew by 3.8% in 2013 compared to the growth rate of 2.2% achieved in 2012. As of 2013, Gartner stated that Workday, Workforce software, Cornerstone On Demand and Net Suite were the five fastest growing vendors. Arm Research and Forrester reports the ERP market size to be \$50.3 billion by end of 2015 (shown in Figure 1.4). This is the ERP growth scenario across the globe.

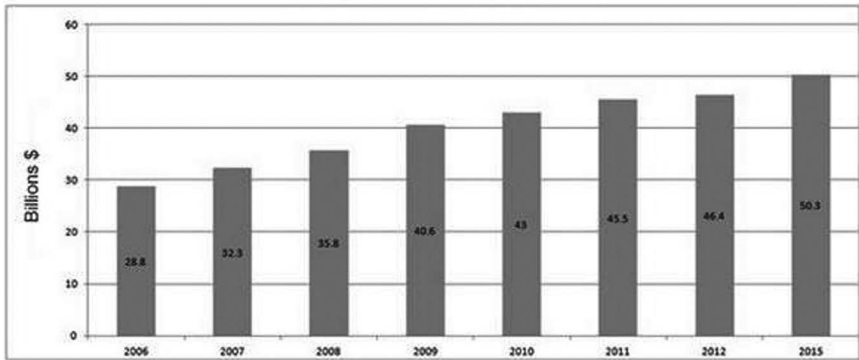


Figure 1.4 Global ERP Market Size (Source:www.forrester.com)

It is imperative to understand the growth of ERP in India in the past few years. Technavio’s analysts forecasted in 2012 that ERP software market in India would grow at a CAGR of 22.2% over the period 2011–2015. One key factor expected to contribute to the market growth was the growing demand of ERP in SMEs. As per the report, key vendors dominating the market space are Infor Global Solutions, Microsoft Corp, Oracle Corp, and

SAP AG. Other vendors mentioned were Sage Group plc, Ramco Systems Ltd., QAD Inc., Tally Solutions Pvt. Ltd., and Eastern Software Solutions. Another forecast by Gartner in 2013 cited that market for ERP in India was expected to grow at a rate of 13% for that year. The trend among ERP software vendors is the expansion plans and concentration on SMEs. Experts at IDC expected software market in India to grow at a CAGR of 10.3% over the period 2014–2018. In 2014, it was again SAP, Oracle, and Microsoft that continued to market leaders in ERP. ERP market was expected to grow at a rate of 12% with SaaS model gaining more growth. Dataquest estimated the ERP market in India to be Rupee 2,233 crore in 2013 compared to Rupee 1,993 crore registered in 2012, which is an increase of over 12%. Another report of Gartner stated that SaaS ERP in India was expected to grow at a CAGR of 28%. SaaS applications in India constitute less than 5% of the overall market of ERP in India. SAP occupies 47% of the market share of ERP in India followed by Oracle at 17% and Microsoft at 11%. Growth of ERP in India is very good, as there is more concentration on SMEs and it is expected to be increasing at a steady pace along with the market for SCM, BI and CRM.

1.7 Lifecycle of ERP

In the next chapter, technology and functioning of ERP will be discussed in detail. Before that, a sound knowledge on the lifecycle of ERP is essential so that an end-user, implementer, or a manager who uses ERP will find it easy to study and understand the different functions and capabilities of ERP. The life cycle of any ERP is similar to the normal software development life cycle (SDLC). The stages involved are designing, growth, maturity, and decline. In any company, and especially textile and apparel industries, implementing ERP will go through the following phases: evaluation, selection, implementation, and post-implementation phase.

Figure 1.5 shows the life cycle of ERP in different steps. Simple steps are given for better understanding of how ERP is implemented. Let us go through the steps to understand the lifecycle in a better way. The process of evaluating and selecting the right ERP will be discussed in later chapters once a better understanding is achieved on the functionality of ERP and the various modules and reports that can be generated from ERP.

Step 1: Decision to invest in ERP. The company decides to go for an ERP solution to cater to their needs. The needs can vary and could be anything discussed in previous sections. Based on the needs, the budget for implementing ERP is allocated.

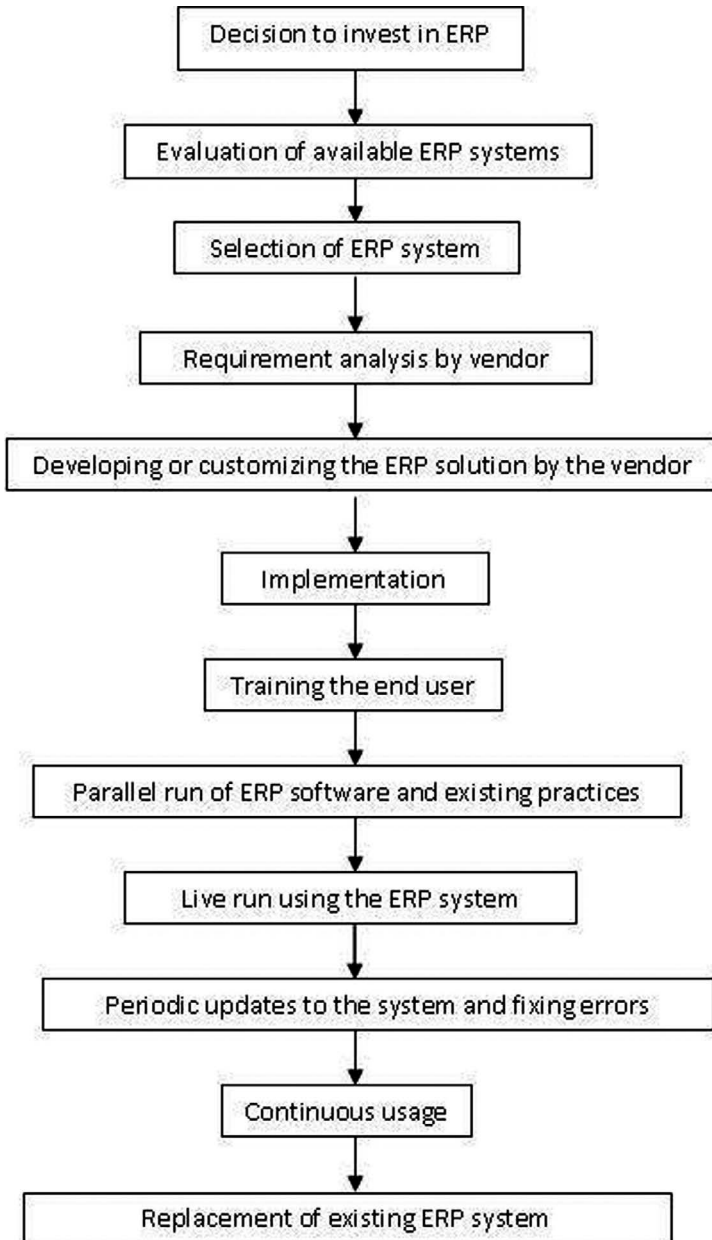


Figure 1.5 Life Cycle of ERP

Step 2: Evaluation of available ERP systems. This process has two key prerequisites: (a) initial planning by the management requiring ERP and (b) formation of a team to take charge of the implementation process and detailed

analysis to be carried out by the team. In initial planning, various decisions need to be taken, such as determining whether industry-specific solutions are required and whether ERP has to integrate multiple locations and businesses. A team should be formed to evaluate various ERP systems available in the market. Therefore, the evaluation process involves choosing the right vendor from among the various vendors. Vendors will be called for to demonstrate the capabilities of their ERP system. During demonstration the vendor should be assessed in the context of various factors, including time limit for implementation, cost for basic package, customization possibilities, types of reports that can be generated, and various modules available.

Step 3: Selection of ERP system. In this step, the various ERP solutions should be compared based on the demonstration given and two to three vendors should be shortlisted. After shortlisting, selection and negotiation must be done to match costs vis-à-vis features required from the ERP. Once discussions are concluded, based on the outcome the ERP software of a particular vendor that provides maximum features for the cost paid is selected.

Step 4: Requirement analysis by vendor. The vendor sends his implementation team to perform a requirement study. It is known as business process study and is sometimes called gap study also. In this step, vendor team will study the business processes of the company and prepare a requirement document that is required for ERP. The existing functionalities of the system will be shown to the various department heads and any changes required will be noted down. Based on changes and customization, there will be some changes in the total cost estimated for implementing ERP. This should be kept as the final step for cost finalization, and any changes in pricing should not be entertained after this step. A requirement document will be prepared stating “AS IS” and “TO BE.” AS IS is the existing process and functionality available in ERP, and TO BE refers to changes to be made to the system for successful implementation of ERP. This is a critical step, as the company requirements are finalized and any major changes in the system cannot be accepted by the vendor after this step. It is essential that the in-house team created for overseeing ERP implementation understands the ERP functionality clearly before finalizing the requirement.

Step 5: Developing and customizing the ERP. In this step, the vendor develops and customizes the ERP software as per the requirement of the company. The vendor develops requirements on the basis of the business process study document prepared as discussed in the previous step. This phase will last anywhere from 15 days to 3 months and simultaneously implementation of ERP can be commenced. In the meantime the company should be ready with the server and database on which the ERP software package will be installed. The requirements of the server and database will be discussed in the next chapter.

Step 6: Implementation. The implementation process involves implementers coming to the company and starting the implementation process by installing the software package and creating the various data required for ERP. Details like materials, machines, company name, and so on will be entered into the system. All the modules of the software will be implemented. This process along with end-user training can last anywhere between 2 and 6 months, depending on the size and processes of the company.

Step 7: Training the end-user. This is a simultaneous step along with the implementation phase. In this phase, all staff and workers of the company who need to use ERP are trained on using ERP for recording various transactions and making appropriate data entries. The training processes involve showing all the available features of the software to the staff and make them enter all transactions to enable them to get familiar with all the functionalities of ERP. All the requirements based on the business process study document are checked in this step. The various reports that can be obtained in the ERP are shown to the users and approval is received.

Step 8: Parallel run of ERP software and existing practices. In this step, along with the existing practices of the company, ERP system will be used in parallel. All the entries made in the existing systems will also be made in the ERP system, and the accuracy of the reports will be checked after the entries are made. Any errors found in the ERP system will be corrected in this parallel run. All the entries will be made by the staff with an implementer supervising their activities. All doubts will be clarified during this period. Any shortcomings in the ERP system will be identified in this phase and corrected quickly before the live run starts. If there are any major requirements arising at this stage, it has to be discussed by the vendor and customer to arrive at an amicable solution. If there is any major change required to be made to ERP, doing so will affect the entire implementation process.

Step 9: Live run using the ERP system. Once all the requirements are met and all the transactions and reports are verified and confirmed as accurate, the existing systems are withdrawn and ERP comes into full force and becomes the only platform in which data are fed and reports are generated. This is the phase where error or bugs surface in the system mostly on account of incorrect entries. So proper care should be taken in ensuring that live run goes smoothly. This is the final step where implementer will be present in the company and oversee the entries and reports generated from the system. The outcome will be shown to the management and a final sign-off will be obtained from the concerned head and implementer will hand over the ERP system to the client's team. The company will then start using the ERP system on its own.

Step 10: Periodic updates to the system and fixing errors. Once live run starts, user will encounter errors or bugs in the ERP system. These can be reported to the vendor and the vendor will correct the errors and send appropriate software updates to fix the bugs and errors. Also frequently, vendors send periodic software updates (colloquially called as patch) that are incorporated into the ERP system.

Step 11: Continuous usage. This is the goal behind ERP implementation; the company starts using ERP continuously and reaps benefits in terms of costs, error containment, and enhanced productivity and efficiency. It is where company's goals for using an ERP system are fulfilled.

Step 12: Replacement of existing ERP system. After using the ERP system for a few years, there will be new advancements in ERP like ERP II, or the company might diversify and would need CRM, BI, or PLM and, hence, may consider replacing the existing ERP system with a new one.

Summary

In this chapter, the evolution of ERP has been explained in detail with timeline. The benefits of using ERP and the needs for ERP have been explained in detail. The various vendors of ERP, classification of vendors based on functionality, industry, and tier have also been explained. The growth potential of ERP with special reference to Indian context has also been highlighted. The chapter speaks of how ERP forms a part of BPR and SCM and also discusses the lifecycle of ERP. The various steps of ERP lifecycle have been explained in detail.

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Technology and functioning of ERP

This chapter gives an outline of the technology behind ERP. It explains the basics of how ERP software is developed to the level that needs to be known to the textile or apparel technologist as they are the majority users. It explains the use of database and how data are stored and maintained. It talks about the various servers used for ERP data storage. The basic functioning of ERP is discussed in this chapter. The chapter introduces master transaction report (MTR) concept to the readers and explains how ERP functions using MTR. It gives details about the static and dynamic data usage in ERP. The workflow in ERP, which forms the most important part of the usage of ERP, is well explained with examples.

Keywords: Database, server, static data, dynamic data, workflow, master, transaction, reports

2.1 Technology behind ERP

The technology behind any data-storing and information-processing system is similar and ERP is no different. It uses database systems to store data. Data mining and data warehousing concepts are behind ERP. It is built on client-server technology. It involves development tools like Visual basic.net or C#.net and various other technologies for developing the ERP software. For a textile and apparel technologist, it is not expected of them to know the complete technology behind how ERP is built. However, it is necessary for them to understand how data get processed in the system after entry and how reports are generated. More detailed study on reporting tools will even enable textile and apparel technologists to develop their own reports or customize reports according to their requirement. In this chapter, general terms like database, server, client, user interface (front-end), back-end, and so on are explained along with technology evolution that has been taking place over recent years. ERP software design and development will also be discussed later in this chapter.

Some common terms used in ERP technology and software development are discussed as follows.

2.1.1 Database

A database is an integrated and composed gathering of sensibly related records or documents or information that are stored in a PC framework that solidifies records already stored in different documents into a typical pool of data

records that give information to numerous applications. It is an information repository. It is the virtual place in the computer where data are stored for future usage. In a simple way, a person in the stores department of an apparel company will have a stock register maintained separately for every year. He will have store indents, issue notes, purchase orders, and procurement requisitions filed separately. Similarly, the merchandiser will have files for sales order, quotation, sampling reports, accessory purchase orders, and so on. All these files will be stored in different racks with names written on them for easy access when needed. A database is similar to this. In the case of manual work, these files will be kept in their respective departments, whereas database is a common place for keeping all files. Database consists of tables similar to racks. It consists of table names similar to file names. So when data is entered and submitted, it automatically goes and gets stored in the corresponding table name meant for it. Then whenever data in that table are called for, the same are retrieved and presented. It reduces manual work and helps with quick processing of data. This example can also be considered to understand how database helps a textile and apparel technologist. If the management wants to know the stock available in the company along with the stock assigned for each sales order received from a particular client over the last six months for which production has not commenced and requests the store in-charge to submit a report, it will be a cumbersome process for the store in-charge to find out how much stock is available, see sales orders received, and then check stock allocated for sales orders for a particular customer over the last six months. Now with a database, all these details can be fetched quickly. When system is asked to fetch the same data, it will be instantly available. The stock table, sales order table, stock allocated for a customer's sales order from the starting date are all stored in the database, and thus, when a query is run, data are fetched immediately, which in turn saves a lot of time. A database management system (DBMS) is a computer software application that is used to manage a database. These types of databases where tables are used are called as relational database management systems (RDBMS). There are other DBMSs too, such as network DBMS, hierarchical DBMS developed by IBM in 1968, and object-oriented DBMS.

The various RDBMS available are Microsoft SQL Server, Oracle, Ingress, Sybase, Informix, and Microsoft Access. The RDBMS used for ERP are mainly Microsoft SQL Server and Oracle. Other RDBMS like Microsoft Access are also used. The latest version of Oracle Server is 12c, which succeeded the earlier versions 11g and 10g.

Microsoft SQL Server 2014 is the latest version, and its earlier versions are Microsoft SQL Server 2008 and 2012. As discussed earlier RDBMS is a software application that is used to manage the database. One of these two servers is used to manage the database. The data are stored in the hard disk.

So a higher-capacity hard disk is used in the case of ERP, which requires a database. Hard disk capacity can range anywhere between 500 GB and 64 TB. However, for a mid-size company, a memory space of 2 TB would be sufficient. Also, RAM plays a major role, and in modern servers RAM capacity ranges from 64 GB to 512 GB.

An example of a table in a database is given in Figure 2.1. Using RDBMS, when a query is executed, the database returns with the data as shown in the figure. The figure shows the list of ERP users in the company. To get the results, a query is typed as shown in the figure “select * from users” (*users* is the table name). It gives the user name, user ID, designation, department ID (department to which the user belongs), salary of that employee, the employee’s superior (to whom the employee reports), and also the incentive for that particular employee. Similarly, we will have thousands of tables to store data in the database.

	UserID	UserName	Designation	DepartmentID	ReportingTo	Salary	Incentive
1	1	JOHNSON	ADMIN	4	6	18000.00	NULL
2	2	HARDING	MANAGER	3	9	52000.00	300.00
3	3	TAFT	SALES I	3	2	25000.00	500.00
4	4	HOOVER	SALES I	3	2	27000.00	NULL
5	5	LINCOLN	TECH	4	6	22500.00	1400.00
6	6	GARFIELD	MANAGER	4	9	54000.00	NULL
7	7	POLK	TECH	4	6	25000.00	NULL
8	8	GRANT	ENGINEER	2	10	32000.00	NULL
9	9	JACKSON	CEO	4	NULL	75000.00	NULL
10	10	FILLMORE	MANAGER	2	9	56000.00	NULL
11	11	ADAMS	ENGINEER	2	10	34000.00	NULL
12	12	WASHINGTON	ADMIN	4	6	18000.00	NULL
13	13	MONROE	ENGINEER	2	10	30000.00	NULL

Figure 2.1 Example of a table in a database

Note: The access to database will be provided only to the system administrators or personnel authorized by the top management, as security and protection of data is required to avoid any changes made to the data. So only authorized personnel will have access to database, and it can be accessed only with a password. Only when a correct password is entered in the RDBMS, it gives access to the database.

2.1.2 Server

A server is a computer that provides data to other computers. It may serve data to systems on a local area network (LAN) or a wide area network (WAN) over the Internet. LAN is a network of computers connected together in a home or office or education institution, whereas WAN is a network of computers across regional, national, or international areas. Any computer can be called as server when appropriate software is installed in it. Servers have higher capacity like more RAM space, hard disk space, high-end CPU, and better hardware to function better. Server receives and executes a request made to it by a software tool or by a user or by another machine in the network. If a server holds a database to store data, it is called as database server, a server used for mails is called a mail server, a server used for printing is called as a print server, and a server used for storing files is called as a file server. In the context of ERP, a server is a computer with high end configuration where an RDBMS is installed in it. The server also hosts the ERP application in it. When ERP is used, whatever screen that appears to the customer is fetched from the application installed in the server. The various servers available in the market are Microsoft Windows 2003, Windows 2003 R2, Windows 2008, Windows 2012 R2, IBM eX5, DB2, XServers X3650 M3, X3620 M3, and X3250 M3.

How does an SQL Server application work is explained using the functional diagram in Figure 2.2.

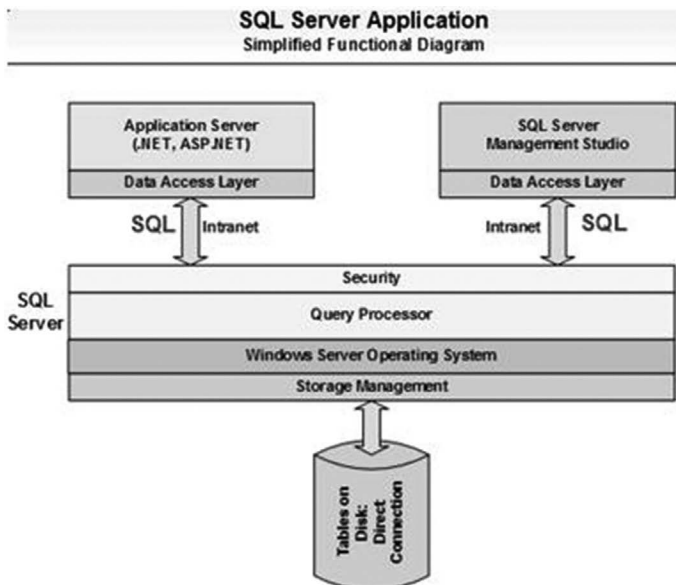


Figure 2.2 SQL server application (Source: <http://www.databaszone.com>)

2.1.3 Client

A client is a computer used to fetch data from the server. In simple terms, the computer used by us to access ERP is the client system. In the earlier versions of ERP, each client had an ERP application installed and these applications sent requests to the server to get the required data. Nowadays, after usage of web-based ERP, web-browsers like Internet explorer and Google Chrome are used to access the server where application, RDBMS, and database with data are kept. ERP can be accessed directly from the server or through client systems available in the network where the server is available. So client systems are nothing but normal computers used by everyone in the network where server is also available. A thin client can also be used for accessing ERP on the server. A thin client is a desktop terminal that has no hard drive. All features typically found on the computer, including applications, memory, and so on, are stored in the data center. This would be useful at terminals near the weaving, spinning, and sewing machines where staff can just enter the production data into the ERP system and there will be no use of a full-fledged computer at those terminals with hard disk capacity. How a client works with the ERP via Internet is shown in Figure 2.3.

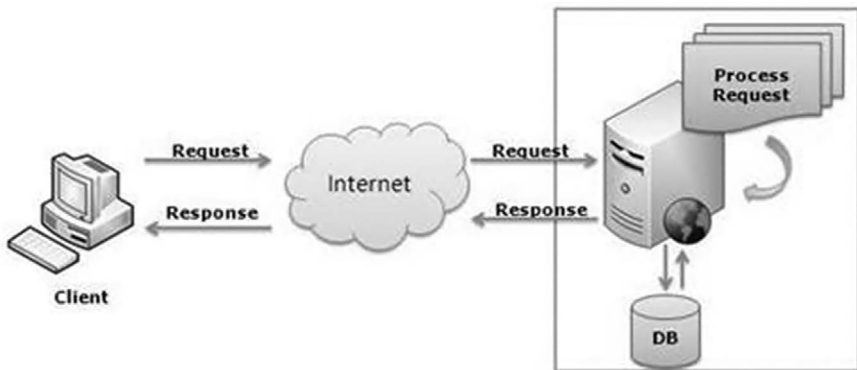


Figure 2.3 Client accessing server through Internet

2.1.4 User interface (front-end)

User interface is the interface between the user and the back-end. It constitutes the elements that user sees in ERP when he opens the ERP application. When we open the ERP application by typing its URL (uniform resource locator like www.google.com) or by clicking on the ERP application, the screen that appears is called the user interface. All the ERP screens starting from login till the screens where we enter data to get reports are all called as user interface. The user interface tools used are hypertext markup language (HTML), VB.net

(Visual basic.net—programming language), C#.net, Microsoft ASP (Active Server Pages) with .net framework, and Cascading Style Sheets with VB.net, C#.net, and Microsoft. The pages, menus, buttons (GUI—graphical user interface) are all created using the user interface tools. The user interface should ensure easy accessibility, usability, and performance so that users find it easier to use the system.

2.1.5 Back-end

Back-end consists of the database and application built with .Net or C# that communicates with DBMS like Microsoft SQL or Oracle to get data from the database based on the requirement from the user interface. For example, when a user clicks “submit” button in ERP that is created using user interface tool like VB, the back-end may be .Net (operating platform) and Microsoft SQL DBMS, and the data submitted are communicated to DBMS via .Net, and once DBMS confirms data submission into the database, it is communicated to the user interface via .Net platform and the “Successfully Submitted” message appears on the screen, which confirms successful submission of data; this is made possible with the user interface programming language.

It is understood that for an ERP system to work, a server with ERP application, RDBMS, database (enough hard disk space), and client is required. It is also understood that a user interface tool, which is a programming language, and an operating platform are required to communicate with DBMS for an ERP system to work. ERP is mainly used as a data-mining and warehousing tool. ERP is used mainly for data storage and using data to gain meaningful information by processing them, which in other words simply refer to data mining and warehousing, respectively. Analytical reports can be obtained from ERP, which are nothing but outcomes of data mining.

2.1.6 Data warehousing

It is a process of converting data into information and making it available in a useful form for further usage of stakeholders as shown in Figure 2.4.



Figure 2.4 Data warehousing process

It is a solitary, complete, and predictable store of information obtained from an assortment of distinctive sources made accessible to end-clients in a manner they can comprehend and use it for their business purpose. It helps in providing information for decision making that was not possible previously. It uses RDBMS and multidimensional RDBMS to support management decision making. An information warehousing or data warehousing is a duplicate of transaction data particularly used for reporting. It helps in providing information for aiding management decision making. It started from being an offline operational database and had developed to the current stage of being an integrated data warehouse where data are updated every time a transaction is made. Data warehousing provides homogeneous data that can be easily used for further analysis. It consists of a single database and the information is retrieved from the warehouse using queries or as analysis reports. It gives integrated data, better information, provides a repository for all customer data to do segmenting and targeting, increase visibility, and so on. As seen earlier, ERP provides all the benefits stated in the previous line and helps in providing information required for taking decisions, and hence, data warehousing is a critical part of ERP functions.

2.1.7 Data mining

For the most part, data mining is the procedure of breaking down information from alternate points of view and condensing it into valuable data — data that can be utilized to build income, cut costs, or both. Information mining programming is one of the various systematic devices for breaking down information. It permits clients to break down information from a wide range of data, classify them, and outline the realized relationships. In fact, information mining is the procedure of discovering connections or examples among many fields in extensive social databases. Oracle defines data mining as the “practice of automatically searching large stores of data to discover patterns and trends that go beyond simple analysis.” Data mining uses advanced numerical calculations to process data and assess the likelihood of future occasions. It involves finding a pattern in the data set on its own, predicting the possible outcomes and creating information against which actions can be taken. It identifies patterns from large data measuring up to many terabytes. It differs from traditional market research as latter often involves finding the overall market for a product and identifying customer’s likes and dislikes rather than mining huge amount of data using complex algorithms to find out patterns of consumer’s preferences and buying habits to market the product better, which is actually possible with and specific to data mining. Data from ERP are used for data mining.

For example, consider the case of an apparel retail outlet located at the southern part of India; here data mining systems are used to find buying

patterns. During weekends, whenever a top was purchased in the shop, a stole was also purchased along with leggings. However, it was found that during weekdays, top, leggings, and stoles were also purchased separately. Further analysis using data mining showed that customers who bought all the three items together on weekends were the same set of customers who purchased leggings, tops, and stoles separately during weekdays. It was also found that they spent an average of 15 to 20 minutes during weekday purchases and more than 50 minutes on weekends. The shopkeeper understood that on week days, women mostly came alone for need-based purchases and during weekend they came with their spouses and had time to make purchases at leisure. So to increase sales during weekdays, the shopkeeper gave discounts to customers who bought all the three items instead of one item and that resulted in increased sales. The data mining process is shown in Figure 2.5.



Figure 2.5 Data mining process

These kinds of analyses are possible using data mining, as it captures various data like operational and transactional data and converts them into information to gain knowledge on both future purchasing trends and past historical purchase trends. Data mining is done using ERP, so ERP encompasses data mining also. For a textile and apparel technologist, a bird's eye view of data warehousing and data mining is sufficient, as the focus of technologist would be on utilizing ERP to its maximum benefit.

2.2 Technology evolution of ERP

The technology of ERP has changed over the years, and it is essential to know how ERP technology has evolved over recent years before we go further to discuss the architecture or software design of ERP. Initially, mainframe systems were used to run ERP and later client server models were used, and now ERP is run on web-enabled platforms with present focus on running in cloud systems [Figure 2.6](#) explains the technology evolution of ERP over the years.

- **Stage 1: Mainframe for ERP.** Initially ERP systems were running on mainframe computers and could support simultaneous usage of about 100 users. Graphical user interface (GUI) did not arrive at that period, and users connected to mainframe system through terminals without any memory or processing power. They just entered and viewed the data. It was very difficult for users who had no technical knowledge to use ERP in mainframes.

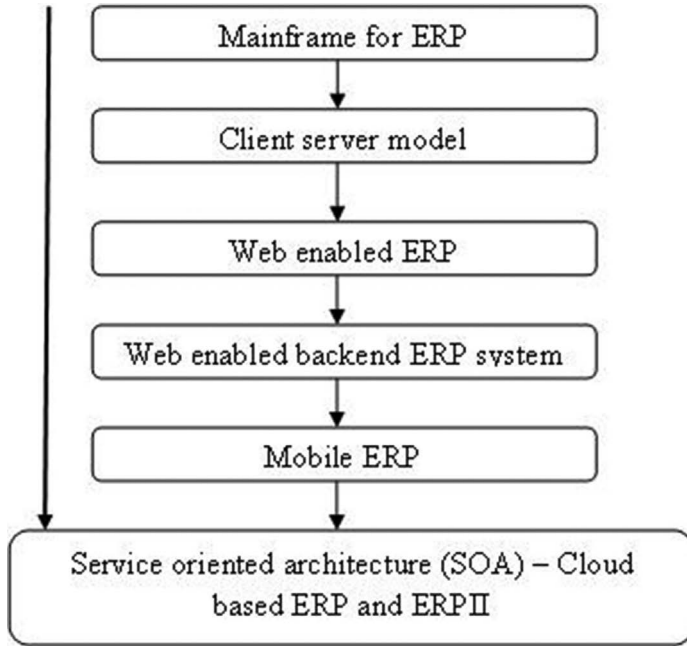


Figure 2.6 Technology evolution of ERP

- Stage 2: Client server model.** Mainframe computers were used before 1990s and were later replaced by servers and personal computers. In this era, personal computers were made with better configuration and provided better user interface through GUI, and they acted as clients. Midrange servers and PC servers were developed as a replacement for mainframe systems. The client and the server combined as a client server model that enabled ERP system functioning. In this model or architecture, server had the central database and ERP application was installed in it. There were many layers present in this model, like presentation layer, application layer, and database layer. We will discuss these later. Client hosts one part of the software and server hosts the other part. Users use client computer and enter data or request reports from the server that hosts the database at a central location. The server has the application that communicates with the database based on the request it receives from the client and processes the same.

In this stage, the mainframe computer gave way to the multilayered, decentralized model of client server. Desktop computers were connected to server through LAN using networking devices like routers and hubs. It was required to have one part of the ERP application installed in the client PC to access the server, and hence, it limited the usage of ERP outside the LAN.

- Stage 3: Web-enabled ERP.** The limitation of usage in LAN was eliminated once advanced Internet technologies became available. This was a development over the desktop-based client server model, as using internet-based technologies enabled access to ERP systems from any part of the world using a simple URL. There was no need for installing one part of the application software in the client; thus, it was possible to access ERP using any internet-connected PC from any location. Usage of thin client PC for making data entry for production data related to processes such as sewing or ring frame end-breakage was also predominant during this stage. Internet browsers like Internet explorer, Chrome, Mozilla Firefox were used to access ERP. Java applets were used to eliminate installing of client-side application software, as they downloaded automatically whenever a connection was made by the client. It was required to have a web server (HTTP server) in the server-side to generate HTML pages (screens viewed by users to enter and see information) to respond to client instructions. Web-enabled ERP is now available with all major vendors, and mostly companies go for web-enabled ERP, which enables access of ERP from anywhere in the world with an Internet connection. The client server path architecture in web-enabled ERP is shown in Figure 2.7. It shows how client accesses server and how server responds to client’s request by getting details from the database.

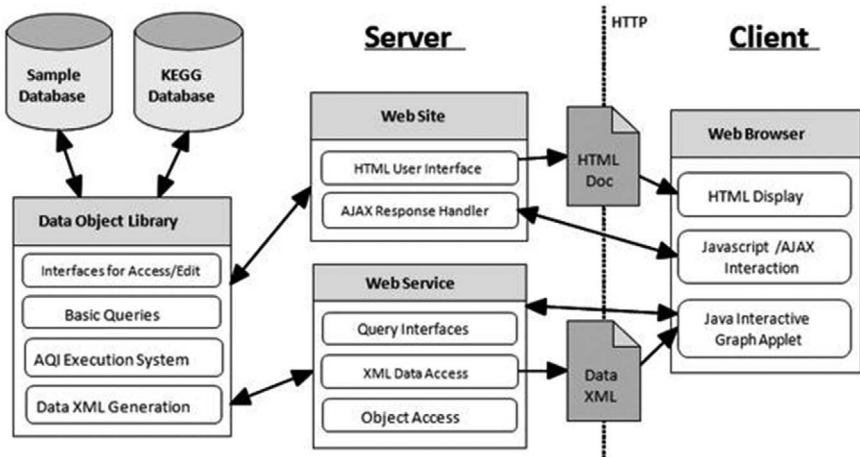


Figure 2.7 Client server path architecture

- Stage 4: Web-enabled back-end ERP system.** Web enabled back end ERP system is the next stage in which access is provided to the backend ERP system through secure internet link so that the suppliers and vendors

can access the database or the application server through internet. This makes the job of vendors and customers easy, as any problem or errors in the ERP system can be corrected by vendors themselves as they can connect to the backend server from their own locations and avoid unnecessary traveling to customer location to resolve any issue. For this to be efficiently carried out, there is a need for Java 2 enterprise edition (J2EE—a platform for developing, building, and employing web-based applications online) or any other server scripting language like PHP, Python, and so on. Old ERP systems are a little complex in nature with less flexibility; hence, they need to be redesigned to make them J2EE-compliant. However, new ERP systems incorporate this feature.

- **Stage 5: Mobile ERP.** In this stage, ERP application can be accessed using mobile devices. Android apps or iPhone ERP apps have been developed to access ERP solutions. Mobile ERP can be app-based or web-based. For web-based systems, responsive web designs and HTML5 technology are used. Vendors have been coming up with new mobile technologies to access ERP, and use of ERP through mobile is slowly gaining grounds in India; it is already the next big thing in ERP.
- **Stage 6: Service-oriented architecture (SOA).** Cloud-based ERP and ERP II are the latest in terms of technology evolution related to ERP, where SOA has given way for new range of ERP tools like cloud-based ERP and ERP II. SOA refers to a software design in which application components provide service to other components through network. In this type, ERP server (database) and its applications are all maintained by a vendor or a third party and they can be accessed by a customer through web browser on his PC or on his mobile using browser or apps installed in the device. The customer needs to pay only for the service he utilized from the vendor, and hence, SOA completely eliminates overheads such as infrastructure, maintenance, and IT operations. Cloud systems are a part of this and they make this pay-per-service possible.

Web-enabled ERP is still predominantly used and will continue to be used for another decade at least. In the meantime, mobile-based ERP and cloud ERP have started to make their presence felt and new technologies are giving way for more development. The above stages explain the technology evolution of ERP over the years.

2.3 Software design

As explained previously, mainframe computers were replaced by multilayered client server models that are still in use. There are various layers in this architecture that are to be first understood before coming to the development process.

ERP software design consists of four layers:

1. **Presentation layer:** It is at the client PC. This layer consists of codes responsible for showing user interface like forms and user controls. It shows the screen requested by the user. It has validations enabled, like stating a mandatory field is blank, invalid dates, and so on.
2. **Business layer:** This layer is used for implementing the request made by the user in the presentation layer. It handles instructions received from the user and executes them by connecting with the data access layer to access the RDBMS. It has codes that implement business functionality. It executes processes such as order creation, production order issue, and so on, if the conditions are met by the user by entering and requesting appropriate details. It connects with data access layer to get data to accomplish these functions. This business layer can be installed in the database server, or it can be installed in another server that can be used as application server so that processing capability can be increased. If separate servers are used in the network for different purpose, then speed of execution will be faster; for example, for mailing of purchase orders generated by ERP to the vendors, a separate mail server can be used to process the request and a separate print server can be used for printing the purchase order report instead of using one server each for application, mail, print, and data storage. However, it also depends on the magnitude and scale of operations of a company. Business layer is developed using C# or VB.NET.
3. **Data access layer:** The data access layer provides access to database. This layer provides access to database through RDBMS like Microsoft SQL Server, Oracle Server, and .NET technology, especially ADO.NET. ERP application accesses the data stored in the database through RDBMS using the ADO.NET technology. These two layers, business layer and data access layer, are known as application layer in combination. Both layers can be installed in an application server.
4. **Data layer:** In this layer, the database is available. The data are managed centrally in this server. The data are accessed using RDBMS. This layer uses queries and stored procedures so that data extraction becomes easy; for example, if we want to create a new transaction from which data need to be obtained from three tables instead of one, then the stored procedure can be modified or else the .NET application code has to be changed.

In the latest SOA, there are various layers available and are as follows:

- Consumer interface layer
- Business process layer
- Services

- Service components
- Operational systems

2.4 Software development

Nowadays textile and apparel companies are creating their own customized ERP. For example, SCM group (The Chennai Silks Pvt. Ltd) has created a customized ERP. Creating in-house ERP gives lot of advantages to the companies as it enables them to create an ERP with all required functionalities, make modifications when required, and access source code on which the ERP is developed so that changes can be made for future requirements. Similarly, if any company wants to create a customized ERP, following points need to be borne in mind:

- First, a core team having experience in creating ERP software should be formed
- It should involve product technology team for giving inputs
- They should have better understanding of the long-term goals of ERP
- They should be well aware of the latest technology in developing the software and also a very clear technical know how on the existing business processes

Once the above points are taken care of, the following tools can be used for developing ERP software.

- **ERP software platform:** .NET technology can be used as the platform. It can be chosen because it insulates the ERP functions from the operating system and makes applications to work more efficiently. It has better security, connectivity, scalability, and managed code that identifies software errors before systems crash, and facilitates faster, easier software development.
- **OOPS paradigm:** As discussed earlier about design, layers can be created for software development. Business layers should be built using object-oriented programming (OOPs) concept. Therefore, business layer can be built using C# or VB.NET or C++ or Java, which are object-oriented languages. C# and VB.NET would, however, be more suitable. Presentation layer is built using ASP.NET also. Grid-view control and details-view control are used in presentation layer for handling spreadsheets during data entry and enabling single-data-display item at a time, respectively.
- **Entity framework:** It enables to create ERP applications without considering the database structure. ADO.NET can be used in the data access layer to access the RDBMS to get data.

- **SQL Server:** It is very much required as a part of ERP system, as SQL Server is required to store and access the data stored in the database. Microsoft SQL Server or Oracle Server can be used as RDBMS in the data layer.
- **Web-based ERP and mobile ERP:** For web-based ERP, ASP.NET can be used for presentation layer with C# in the business layer. For creating mobile applications, knowledge on Java and Android SDK is required. Mobile applications should have interactive presentation layer and should facilitate ease of operations in handling databases efficiently.
- **Reporting tools:** Microsoft Excel and crystal report builders can be used for creating reports.

The above tools can be used for ERP software development if any textile and apparel company opts for developing in-house ERP.

Major ERP vendors like SAP and Oracle use their own proprietary languages instead of using Microsoft .NET platform. SAP uses Netweaver computing platform with SAP web application server (WebAS). Advanced business application programming (ABAP), which is a high-level programming language is used for building Netweaver. It also uses C, C++, and Java enterprise edition and interoperates with technologies such as .NET and Java enterprise edition. Oracle uses BPEL/PLSQL (business process execution language and procedural language extensions to SQL) and java programming language, whereas Peoplesoft uses its own proprietary language named People code and PLSQL.

2.5 Desktop-based ERP versus web-based ERP

In recent times the desktop-based ERP system has transformed into web-based system that can be accessed from anywhere in the world using web browser. The web-enabled ERP has practically won over the desktop-based ERP in the past decade and has gained strong foothold in major ERP markets. All recent ERP developments are web-based and not desktop-based. The major advantages of web-enabled ERP systems compared to desktop-based systems include the following:

- No need of client systems.
- ERP application need not be installed in client systems
- Implementation time is reduced
- Saves money and reduces total cost of ownership
- ERP can be accessed from anywhere in the world just by accessing the URL and entering user name and password

- Any approvals and orders can be given through ERP from anywhere
- Easy to upgrade with advanced software modules and features
- Troubleshooting is easy if any error occurs in the ERP system
- Can be accessed through mobiles, tablets, and PDAs
- Maintenance is easy as upgrades need not be installed time and again in each client system

However, there appears to be a major concern in web-based ERP application and that is security, which involves information privacy and loss of data. It is essential that ERP systems are built with enough security features so that information can be used only by the intended users.

2.6 Security in ERP systems

With ERP systems offered as web-enabled and cloud-based applications, it involves lot of security issues. There is a chance for someone to get data related to the company or personal information of an employee or any data that can be obtained from the ERP system. The simple way to control this would be to have user-level control. It should be set in such a way that appropriate controls are given to enable access to particular users for particular transactions and not all. For example, user-level controls will enable us to determine the screens that a user can view, modify, and delete. A purchase assistant should not be given authority to approve a sales order, and thus, sales order should be only viewable for him and not editable. Similar controls can be set by clearly assigning roles for users. It is not only internal employees who access the ERP system but also suppliers, customers, and vendors. Different levels of access rights should be given to each one of them. Passwords should be encrypted and stored in the database so that no one will have access to other user's accounts.

New initiatives increase security threat. Activities such as online delivery tracking, quality tracking, and e-procurement increase risk of security breach. One way of ensuring safety is by encrypting all the data entered into the ERP system and have proper firewall, virus scanner, spam control, and proper back-up devices to avoid system crash.

The various ways of providing security are as follows:

- i. *User-based control*: Assign roles and give access to individual users only for those screens that are relevant to them functionally.
- ii. *Security policy and administrator*: Have a security policy in place and depute an administrator to create and manage user-level controls and roles

- iii. *User authentication*: Use passwords to enable user's login to the ERP system
- iv. *Time restriction*: To log off once preset time is reached or if log-in remains inactive beyond pre-set time for usage
- v. *Log and trace*: All events are entered into the log
- vi. *Database security*: Only server administrator should be able to access the database

Advanced role-based access controls will avoid security compromises, and companies like SAP, Oracle have implemented proper security measures in their software to avoid potential threats.

2.7 Functioning of ERP

ERP system functioning is based on the data fed into the system. An ERP system will not be of any use to the stakeholder if proper data are not entered into the system. Correct, appropriate, and accurate data input is key for proper functioning of ERP and, thus, providing the ultimate benefit to the customer. ERP system processes the data and gives meaningful information to the end-users. Data are input into the system and then data are used to generate various reports required for information sharing and analysis. Data can be input into the system manually or integrated with machine output or through barcode scanners or by any other means of quick access controls.

2.7.1 MTR concept

ERP functions on the MTR concept. The acronym MTR that stands for master, transaction, and reports is used for better understanding of how ERP functions. Before going into the concept, it is to be understood here that ERP software has various modules. Modules are nothing but each department activities grouped under one module for easy working in ERP. For example, quotation, sales order, sampling order, and costing are all activities of merchandiser in an apparel company, and so they come under the module named *merchandising*. Similarly, there are various modules like production, inventory, finance, HR, procurement module, and so on.

2.7.2 Master

Master data are commonly used data in ERP. They are used by all the modules in the ERP system when required. It is linked to all the modules. It is a central warehouse of information that can be used by all modules

for transactions when required, thereby eliminating duplication of data, which is typical to environments where non-ERP, function-specific software are used, creating in turn islands of systems. Master data do not change like transaction data. Master data include details about company, vendor, customer, employee, machine, and so on. These details can be accessed by procurement department when they want to create a purchase order, and the same data can also be accessed by production department to plan production output for specific machinery and for the employee allotted to operate those machines. Masters are created as the first step of ERP implementation and data are added moving forward when required. For example, all the customers of the company are entered into the master initially when ERP implementation is started. Then, whenever a new customer comes, the master is updated by creating records for new customers.

Master data can be maintained centrally or can be handled by individual departments. During implementation, it will be decided on who will maintain master database. There will be module-specific masters that can be maintained by specific departments. For example, supplier master can be maintained by purchase department and materials master can be maintained by stores. Masters like company and business units will be maintained by the IT department. The master data have to be entered before any transaction is made, as all transactions are based on master data. Master data will appear in transactions as drop-downs or lists from which the user can select the required one. For example, creating sales order using ERP sales order creation page in the sales module feature, there will be a space to select customer's name and the name of the customer will become visible in the drop-down or can be searched and selected using the search tool. This avoids duplication and erroneous entry of customer name and maintains uniformity and easy traceability. Visibility of the system also increases. Masters are like parents for transactions. Transactions operate within the framework of master data, which means transactions can be entered only for the master data that are available. Before listing down the various masters available in the ERP system, the working of ERP systems is explained.

2.7.3 Login screen

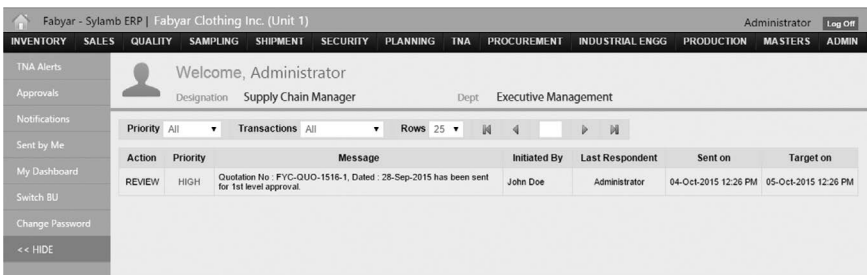
To understand functioning of ERP better, screenshots of ERP software are used. If it is a desktop-based ERP, the application will be double-clicked and opened to get the login screen. In the case of web-based ERP, the URL is typed in the browser and upon pressing enter the login screen comes up, as shown in [Figure 2.8](#).



Source: Sylamb ERP by Fabyar Computing

Figure 2.8 ERP login screen

Once the user name and password are entered correctly, the home screen of the ERP system opens and is shown in Figure 2.9.



Source: Sylamb ERP by Fabyar Computing

Figure 2.9 ERP home screen

The home screen displays user name, company name, and various modules that user has access to on the top, and the screen has workflows showing action items, information items, escalations, and sent items, which will be discussed later in this chapter. The user can click on the module that he needs to work with. For example, production supervisor may click on production module. Initially a superuser will be created on the database side and that user will be used to create all the masters. Initially when logged in with super user, the company name will not be there and it has to be created using the company master. Similarly, all the masters need to be created before starting transactions. All masters and transactions will have a search screen, view screen, and edit or create or modify screen to perform various actions.

The various masters to be created are as follows:

User master: In this master the user name will be created with a password. Figure 2.10 shows the master where a user name is created.

It has fields for entering a unique user name, companies, business units, and department (activity unit) that the user needs to access. The user screen rights are identified based on the department and user’s designation. Various user screen rights are provided when a user clicks on the user screen rights button and access is given to each screen.

Figure 2.10 Create users master

Similarly, there are various other masters created, which are as follows:

- i. Company master: All the details of the company are entered
- ii. Business unit master: Various business units of the organization are entered
- iii. Department master
- iv. Role creation

- v. Unit of measurement master
- vi. List of holidays for financial year
- vii. Currency master
- viii. Machine master
- ix. Material master
- x. Employee master
- xi. Country master
- xii. Delivery term master
- xiii. Exchange rates
- xiv. Material group master

The list is not exhaustive, and similarly, there are so many masters that are created at the starting stage and updated when necessary. Apart from these masters, there will be module-level masters too. For example, procurement department will have masters like yarn master, trim master, and so on. All these data can be uploaded directly to the ERP system at the starting stage from Microsoft Excel. ERP vendors use that option, as there will be large amount of data to create and manual creation would be a cumbersome process.

Once these masters are created, transaction entries are made.

2.7.4 Transactions

These are the entries made into ERP system to get meaningful reports. Once the masters are created, transactions can be carried out.

Figure 2.11 shows how a procurement request is created. All transactions have header details and line items. The ones that are common to all line items will be given in the header. In this procurement request creation, it shows various fields that come from the master. If data are not available in the master, then it will not be shown here. Company name, PR date, business unit, requesting company, procuring company, material code, suggested vendor and UOM selected from the master and in the details view tab, quantity of the material is entered along with expected delivery date. After entering all the data, the request is submitted to create procurement order using the procurement order transaction page. Now this is a transaction carried out using the master data and previous transactions like sales order creation. The entire functioning of ERP is based on the transactions created in the ERP system.

Procurement Request

PR Detail PR No. <input type="text"/> PR Date** 04-Oct-2015 Completion Date** <input type="text"/> Document Status INITIAL Workflow Status UNINITIALISED	Requesting Header Requesting Company* Fabyar Clothing Inc. <input type="text"/> Requesting BU** Unit 1 <input type="text"/> Requesting AU <input type="text"/> Created By admin Remarks <input type="text"/>	Procuring Header Procuring Company* Fabyar Clothing Inc. <input type="text"/> Procuring BU** Unit 1 <input type="text"/> Procuring AU <input type="text"/> Reference Type <input type="text"/> Reference Source <input type="text"/> Reference Value <input type="text"/> <input type="button" value="Fetch Materials"/>
--	--	---

SOURCE MATERIAL LIST

Material Code	Description	Required Qty	UOM

DETAILS - VIEW

Material Code	Description	Quantity	UOM	Expected Delivery On	Suggested Vendor	Remarks
C-RANK30MM	CRANK 30 MM DIA	20	PCS	30-Oct-2015		

Source: Sytab ERP by Fabyar Computing

Figure 2.11 Creating a procurement requisition

The various transactions created are as follows:

- i. Quotation
- ii. Sales order
- iii. Production order
- iv. Purchase requisition/Procurement requisition
- v. Purchase order/Procurement order
- vi. Goods received note
- vii. Store indent
- viii. Issue note
- ix. Vendor invoice
- x. Production entry
- xi. Packing list
- xii. Dispatch advice
- xiii. Delivery challan
- xiv. Commercial invoice
- xv. Return note

These are some transactions mentioned here that consist of all modules. In the next chapter, we will see module-wise transactions in detail. Once these transactions are created, then using these transactions, data mining can be done internally and any reports can be obtained from the ERP system when required.

2.7.5 Reports

The output from ERP is the reports which help in decision making and getting the information at the right time. There will be information reports, action reports, analysis reports that come out from ERP. With just one purchase order entry, various reports can be obtained from ERP. For example, purchase order report, previous three months' purchase order report, vendor-wise purchase order report, and so on are information reports, and vendor-wise cost for a particular material, material cost increase in the past one year, vendor-wise delay in the previous purchase orders are analysis reports.

Purchase order (procurement order) report sample is shown in Figure 2.12. This is an information report that can be printed, signed, and sent to the vendor for supplying material. The report will have all details that were entered during the purchase order (procurement order) creation. It will have vendor address, delivery date, material details, PAN number, terms and conditions, and so on that are shown in the sample report.

ABC Exports

Phone Fax	PAN No Reg No VAT/TIN No							
Fabric Purchase Order								
To Phone Fax Email	PO No Approval Status APPROVED Dated 11 Jul 2014 Payment Terms PDC Delivery Terms Door to Door Delivery Date 12 Jul 2014 Deliver At							
Dear Sir, Kind Attn: We have pleasure in placing with you our order for the following goods on the condition mentioned below.								
SL NO	Material Description	Colour	Width/Dia	Quantity	Unit	Rate(INR)	Discount(INR)	Amount(INR)
1	60S'60S 144X72 100% COTTON WOVEN Twill 2/2 Yam Dyed GREEN	GREEN	50.00	6.00	MTR	150.00	0.00	900.00
Item Value in INR								900.00
Total Amount In INR								900.00
Amount in Words : INDIAN RUPEE Nine Hundred Only								
Terms and Condition								

Figure 2.12 Purchase order report

Some of the reports available in ERP are as follows:

- i. Sales order report
- ii. Production order report
- iii. Production report

- iv. Employee-wise production report
- v. Material stock report
- vi. Production-delay report
- vii. Maintenance schedule report
- viii. Absenteeism report
- ix. Performance analytics report
- x. Ratio analysis report
- xi. Compensation analytics report
- xii. Quotation versus sales order report
- xiii. Costing report
- xiv. Merchandiser-wise profit report
- xv. Invoice

Similarly thousands of reports can be obtained from ERP that can be used for decision making, and reports of each module and their uses will be discussed in the upcoming chapters.

Basically, ERP has masters created and then transactions are created by using masters and real-time information. Based on the transactions entered, reports are obtained. Functioning of ERP is simple, and there is no difficult science involved in its working. Any layman would be able to use ERP and gain benefits out of it through the reports obtained from it. The following are the different types of data used in creating database to be used for the creation of ERP system:

Static data

Technically, any data entered once and not changed further are called static data. They include masters like company master, business unit master, role master, currency master, and country master.

Dynamic data

These are the data that frequently change. All transactions and some of the masters like customer master and materials master are examples of dynamic data, as we add data when required. Technically, static data are stored in class and dynamic data are stored in objects. Class is an extensible program code template for creating objects. So it means static data like masters that are referred to as class are used to create dynamic data like transactions that are referred to as objects.

2.8 Workflow and notifications

Workflow, notifications, or information sharing using ERP is one of the main activities of ERP. ERP helps in sending real-time information to all stakeholders. Workflow can be tracked using ERP and appropriate action can be taken by the concerned person even if he is not physically present in the location. For example, if there is a quality deviation in U% of the yarn, it will e-mail the quality manager stating that there is a deviation in the quality so that he can take immediate action wherever he is. Similarly, if required, production is not achieved within 4 hours of the start of production, an e mail can be sent to the concerned manager through ERP, highlighting the production status where the manager can take immediate action. All this is possible only when real-time data are properly entered in the ERP either through automatic data transfer or manual entry. The above example is a way of notification to the stakeholder. The various ways of notification followed in practice are as follows:

- i. E-mail
- ii. SMS
- iii. Pop-up on the computer
- iv. Message on the ERP screen when logged in
- v. Ticker that runs on the stakeholder PC similar to the scrolling in the news channels

By these ways quick actions can be taken. Apart from notifications, workflow tracking is also an important activity. Reference can be made to [Figure 2.9](#) to understand workflow better. It is the home screen of ERP software once logged in. It has a grid showing action, priority, message, initiated by, last respondent, sent-on, and target-on columns. Under action column, it shows the action to be taken for the message, and the priority of that action is shown in priority column. It shows who initiated the action in “initiated-by” column with details about the last respondent for that transaction. It also gives details about when it was sent for review and what is the target date for review to be completed. Purchase (procurement) order creation can be taken as the example to understand the workflow.

- Once a purchase order is created, it is sent for approval through the system by selecting an option called “initiate review” in the purchase order transaction screen.
- Once it is sent, in the action column, it will show that the purchase order has been sent for approval to the purchase manager. Workflow access is given to the appropriate personnel by the system administration department based on the user name and role.

- When the purchase manager logs into the ERP system, he will have an action item displaying that purchase order is waiting for approval with action column showing “review.”
- Once he clicks on that, the purchase order opens with all the details. He can either approve or reject the order with comments from anywhere. Quick and prompt action can be taken without delay.
- Once approved by the manager, it is shown as “information” in the action column in the home screen of the purchase officer who created the purchase order and also as “information” to all other required users like store manager, general manager, and so on, depending on the organization’s requirement.
- It can even be sent as a fax or e-mail to the vendor once approved. There can also be two levels of approval set for an order, and it is easily configurable. If the purchase order was rejected, then it will come as an action item to the creator to modify and resend.
- If no action is taken by the purchase manager on the purchase order after the date mentioned on the target column, then it will show as an escalation in general manager’s login stating that a purchase order is not yet worked upon by the purchase manager, which will enable the general manager to immediately verify and question the delay. This example explains what actions occur in workflow in a specific group of transactions related to one specific activity, that is, purchase order creation in this case.

Similarly workflow can be used for any activity in the following departments/activities:

- Sales order approval
- Costing approval
- Quotation approval
- Purchase order approval
- Store indent creation
- Issue note creation
- Production order approval
- Invoice creation
- Dispatch advice creation
- Packing list creation

The workflow need not always be for an action item; it can also be for an information item, for example, notification that invoice has been created for a particular order.

Summary

In this chapter, the technology and functioning of ERP is explained clearly for better understanding of apparel and textile technologists. The common terms used in technology of ERP like database and server are well explained with examples. The evolution of ERP technology, software design, and development is also explained so that scope is created for textile and apparel companies to create ERP software in-house. Security aspects of using ERP systems are also explained briefly. The basic functioning of ERP, including the MTR concept, is well explained with illustrations. Usage of workflow and notifications are described with examples for better understanding. With this understanding, it will be easy to know the functionalities of various modules of ERP.

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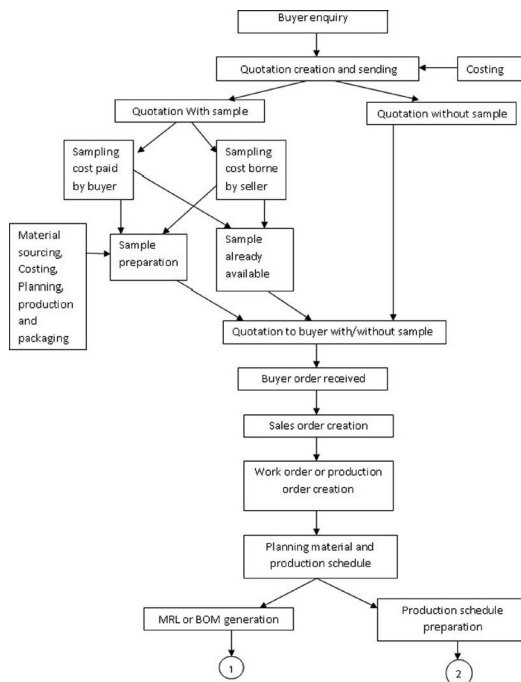
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In this chapter, the various modules in ERP are explained in detail. Initially, the process flow in a textile/apparel company is provided to understand the module classification. The activities, transactions, operations, and functions carried out in each module like production, planning, sales, procurement, inventory, and so on will be described so that it helps to know the specific activities carried out in textile/apparel vertical. The various types of reports or information obtained from these modules will also be highlighted. The workflow process in each module will be discussed.

Keywords: ERP modules, production, planning, procurement, inventory, workflow

3.1 Process flow in a textile/apparel company

The process flow of a textile/apparel company from sending quotation to getting the payment is explained with the help of a flowchart. The flowchart shown in [Figure 3.1](#) will help to understand what is meant by modules in ERP and also give an idea of the functions of each module.



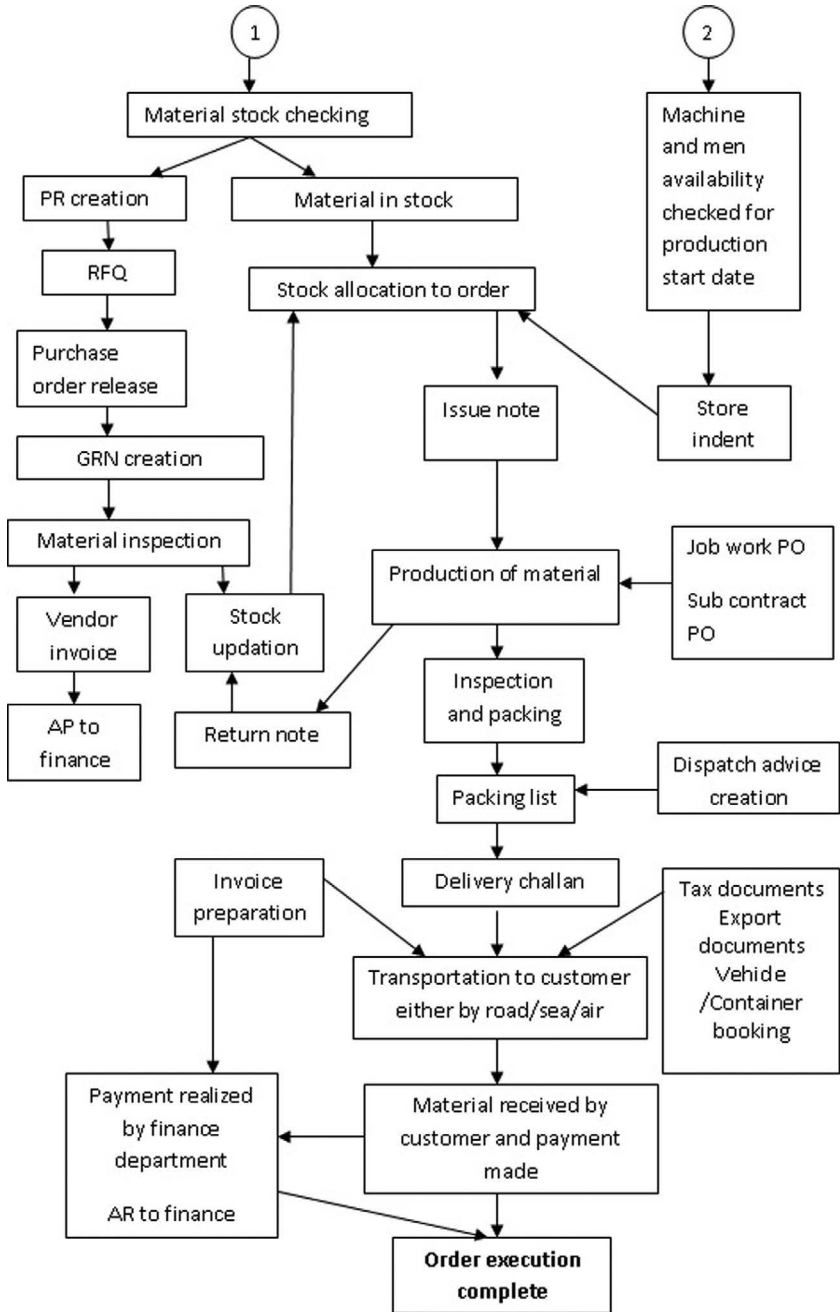


Figure 3.1 Workflow and various operations in apparel industry

- The process flow of an order execution starts from buyer enquiry.
- The buyer requests for quotation.
- The buyer may ask to forward a quotation with or without a sample.
- The sample may be yarn, in case of a spinning unit; woven fabric, in case of weaving unit; dyed, printed fabric, in case of processing unit; and garment or dyed yarn sample, in case of garment unit.
- The sample cost may be borne by the buyer or it can be absorbed by the seller.
- The sample may be readily available if it was produced by the company before or else sample preparation process needs to be carried out.
- The sample preparation process involves material sourcing, planning (marker planning to calculate fabric consumption), costing, production, and packing.
- The above process is handled by the sampling department.
- The costing is carried out using cost of raw material, production, overheads, and all other expenses to be borne by the sales department in association with planning department that has technical experts who know about the manufacturing of the product.
- The quotation is then finalized based on the costing done along with mark-up and sent to the buyer along with sample or without sample as per buyer request.
- The buyer checks the quotation, compares it, and gets back if any clarifications are required or for any negotiations in quality and cost. If both parties are satisfied, then buyer releases purchase order (PO).
- Once PO is received, sales order is created by to start order execution.
- Based on the sales order created, production order or work order is created.
- In case of a garment unit, mostly merchandisers create production order and calculate the accessories requirement and order for them on their own. However, these functions vary from company to company.

In the above activities, it is the sales department's responsibility to create quotation, sales order, and production order along with sampling and costing. In ERP software, all these activities come under the module named "SALES," which consists of all transactions related to the above activities in a textile/apparel company.

- Once production order is created, planning department comes into action. They plan the material, men, and machine requirement for executing the order duly taking the delivery date into consideration.
- Planning department generates MRL (material requirement list or bill of materials [BOM]) for the given order and also prepares production schedule based on the machinery available for production.
- Planning is a complex task and involves lot of experience and logic in ensuring proper execution.
- Planning team checks for the material availability in stock and raises purchase or procurement requisition to purchase department to purchase materials. Materials could be greige yarn, dyed yarn, fabric, accessories, packing materials, trims, and so on.
- Planning team also checks for availability of men and machinery and requests HR team and maintenance team for any requirement in case it becomes necessary to recruit or train more people, and maintaining, repairing, or replacing the existing machinery, respectively.

All the above processes are carried out by planning department, and in ERP it is called as the “PLANNING” module that encompasses all transactions related to the above processes. Along with this HR team takes care of recruiting, training, human relations, pay roll processing; all these come under “HR” module in ERP, where all related transactions are carried out. Similarly, there is a requirement in the above process for maintenance team to maintain machinery properly. It includes creating maintenance schedules, carrying out preventive and routine maintenance, replacing and repairing parts and machinery, and increasing the life of machinery by reducing depreciation. All these activities are carried out by maintenance department and in ERP these transactions come under the “MAINTENANCE” module.

- If material is available in stock, then inventory or stores department is advised to allocate stock to execute an order.
- If material is not available and purchase requisition (PR) is raised, then purchase team requests for quotation from vendors.
- Once quotations are received, cost, quality, delivery date, and material specifications are checked, and after negotiations, if required, the vendor is identified and the order is placed.
- Once material is received, stores or inventory department creates a goods received note (GRN) or materials received note (MRN) and inspects material with the help of quality control team. If the quality of materials is satisfactory, then stock is updated.

- The vendor invoice for materials supplied is then passed onto finance for accounting under account payables and to release the payment for the same.
- Materials received are allocated to the particular order so that it is not used for any other order.
- Once production date gets close, production department issues a store indent for getting required material from store.
- Based on the store indent received, stores department issues material by creating an issue note and the material is taken for production.
- During production, if the quality of material supplied is bad or not within standards or if there is excess material, then material is returned to stores through return note.
- Materials that are returned are checked for usage in some other orders, or else the vendors are asked to take back the material if such provisions exist in the PO.

The above activities related to request for quotation (RFQ), PO creation, and vendor invoice submission to finance are carried out by purchase, and in ERP, it comes under the “PURCHASE” or “PROCUREMENT” module for creating all transactions associated with purchase. The activities of stock allocation to order, GRN creation, stock checking, stock updation, issue note, and return note creation to take back materials from production are all carried out by inventory or stores department in a textile/apparel company. In ERP, all these activities are entered through the transactions available in the “INVENTORY” module. The vendor invoice is submitted to finance department to make payment and all those activities are entered in ERP under the “FINANCE” module. Checking for material availability for commencing production and creating store indent are activities of production department, and in ERP, all these activities are executed under “PRODUCTION” module.

- The production is then started and the material is issued from one process to another process, like drawing to simplex in spinning industry, warping to sizing in weaving industry, scouring to bleaching in dyeing industry, and cutting to sewing in case of garment industry.
- Production of final product is carried out.
- In this process, sometimes processes like singeing in case of yarn or embroidery in case of garmenting may be done outside as a job work or the entire process of manufacturing may be outsourced as a subcontract. In such cases, respective POs are created and material is sent out to complete the process.

- Once production gets going and final product is ready, it is sent for inspection.
- The quality team inspects the product. Tests are carried out like U% measurement in yarn, fabric defects identification in weaving, shade variations in dyeing, and garment defects in garmenting process.
- The product is then sent for rework or reprocess if required or else sent for packing.
- The packing is done and the packing list is created, and based on the list, dispatch advice is created by the logistics department.

The production processes, including rework, reprocess, issuing material between processes, and packing, are all carried out by production and comes under “PRODUCTION” module in ERP. The job work and subcontract works are handled by purchase department as POs are released, which comes under “PURCHASE” module in the ERP system. Inspection is carried out by quality team. All the testing is done by the quality department, and these activities are entered in ERP under “QUALITY” module. Activities such as creation of dispatch advice and packing list are carried out by logistics, and in ERP this activity comes under the “LOGISTICS” module.

- Tax documents, export documents, vehicle booking, and container booking are done for sending the material on time to the customer.
- Once delivery date arrives, a delivery challan is created and material is loaded onto the vehicles for transport by road/air/sea based to get it to buyer’s location.
- An invoice is prepared for products to be sent and is attached with the material so that the buyer can make payment once he receives the materials and invoice.
- The next step would be buyer receiving the material and inspecting the material. After receiving the material, buyer inspects it and if everything is as per requirement, buyer makes payment against the invoice received.
- The invoice and documents created for transport, export banking, tax, and payment are all forwarded to finance department to complete the order cycle.
- Once payment is realized, the buyer is intimated and the *order execution process* gets completed.

Preparation of tax documents, invoice, export documents, and banking documents required for export and container (vessel) booking are all prepared by the export department, and this activity comes under the “EXPORT” module in ERP. In small companies, along with delivery challan, dispatch advice, packing list creation, vehicle booking, the activities of export are also handled

by logistics, and these activities come under the “LOGISTICS” module. Some ERP software has all these activities grouped under “DISPATCH” module. As modules are named by individual ERP vendors, it is their discretion to have the module named as logistics or export or dispatch. The payment is received by finance and accounted for under accounts receivables and these transactions come under the “FINANCE” module.

The complete workflow of an order shows that there are various departmental activities carried out in the order execution and activities of each department are entered in ERP under the relevant department’s name and are called as modules. Hence, departments are named as “MODULES” in ERP. Other modules include supply chain management (SCM), customer relationship management (CRM), and product life cycle management (PLM). In “CRM” module in ERP, it has all transactions related to customer management, which are handled by sales or a specific business development team. A dedicated SCM team may be available to carry out all supply, demand, and forecasting activities. These transactions will be carried out under the “SCM” module. The PLM module may be a part of planning department, or a dedicated PLM team may be provided. All transactions related to PLM will be available in “PLM” module in ERP. There will be more modules available in ERP in addition to the modules listed above, as they aid in the smooth execution of overall activities in a company. There can be generic modules like SCM, CRM, and PLM and specific modules like asset management module, utilities (power consumption, accounting of allied machines usage, and maintenance like boiler in sizing unit), and raw material management module (automatic dye dispensing in case of processing unit, module for automatic and optimum mixing of bales in spinning).

The process flow discussed previously is carried out in any textile/apparel company. The process flow is managed through ERP by creating all transactions using ERP and providing those memos and reports where required for continuous and smooth flow of work. The modules are menus in ERP under which their corresponding function or activity specific to a department is carried out. The modules, along with transactions, consist of all the related reports under each menu.

3.2 Modules in ERP

ERP modules can be classified as technical modules and commercial modules. The modules that execute transactions in relation to technical functions like production, quality, maintenance, and planning are grouped under technical modules. The modules that perform commercial functions like selling, marketing, purchasing, storing, exporting, logistics, HRM, and finance are grouped under commercial modules. The various modules are presented in [Figure 3.2](#).

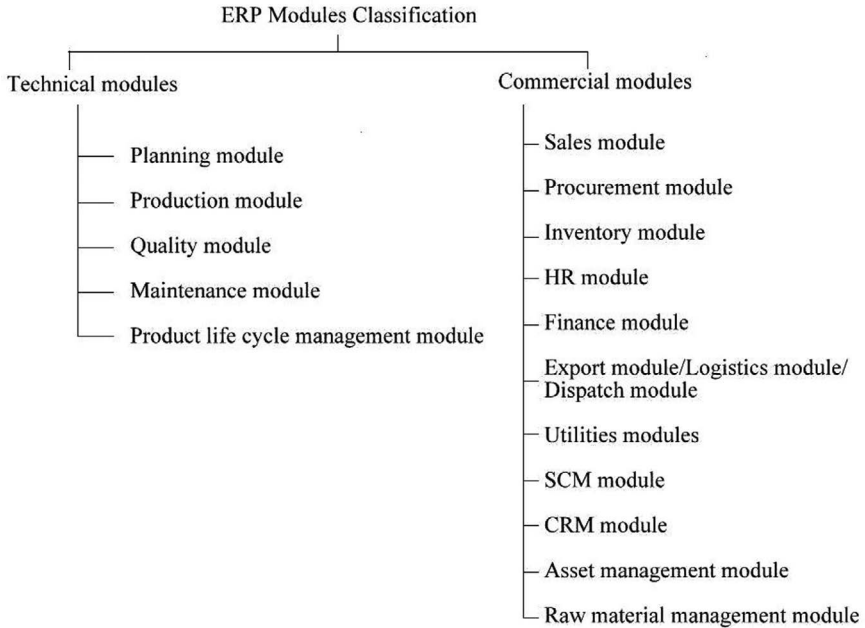
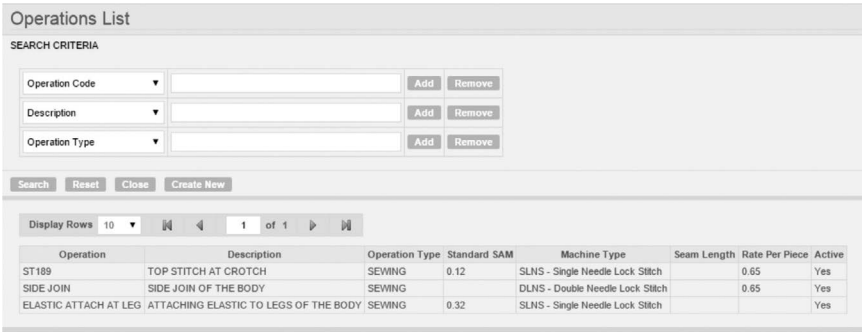


Figure 3.2 ERP modules' classifications

The functionality of modules will be explained along with activities carried out using each module. For each module, its functions, masters, and transactions available in ERP and details of specific reports that can be generated using particular modules are provided. For all the masters and transactions the following options are available in ERP.

3.2.1 Search page

Search-page option is used to search for a particular sales order or a machine. [Figure 3.3](#) shows the search page in an ERP system, for example, a sewing operation master search page. In the search screen, it has search parameters; upon clicking search, it shows all the sewing operations entered in the ERP system. When any one of the line item is clicked, a view page opens.

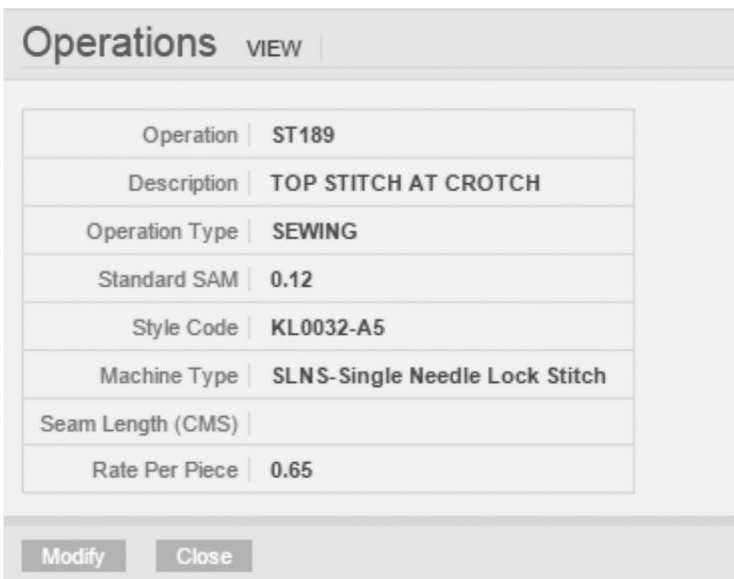


Source: Sylamb ERP by Fabyar Computing

Figure 3.3 Search page in ERP

3.2.2 View page

This option is used to view details of the master or transaction created. By clicking the line item as shown in Figure 3.3, a view page opens, as shown in Figure 3.4. The operation “top stitch at crotch” is shown in Figure 3.4, which gives details of that particular operation.



Source: Sylamb ERP by Fabyar Computing

Figure 3.4 View page in ERP

3.2.3 Create page

This option is used to create a new master or transaction. By clicking on the “create new” button as shown in [Figure 3.3](#), a create page opens as shown in [Figure 3.5](#); here all details related to the operation can be entered and saved. In this page, all details related to the operation can be entered and submitted.

The screenshot shows the 'Operations NEW' form. The 'STEP HEADER' section includes: Operation Code (COLL_ATTACH), Description (COLLAR ATTACHING), Operation Type (SEWING), Standard SAM, Is Active (checked), Style Code, and Remarks. The 'MACHINE TECHNICALS' section includes: Machine Type (SLNS - Single Needle Lock), Seam Length (CMS), and Rate Per Piece. Buttons for Submit, Cancel, and Close are at the bottom.

Source: Sylamb ERP by Fabyar Computing

Figure 3.5 Create page in ERP

3.2.4 Edit/modify page

This option is used for editing or modifying the master or transaction. In [Figure 3.4](#), when “modify” button is clicked, the edit or modify page opens as shown in [Figure 3.6](#). In this page, users can modify data that are allowed to be modified. Primary data or main data like operation code cannot be modified and other details can be modified as shown in [Figure 3.6](#).

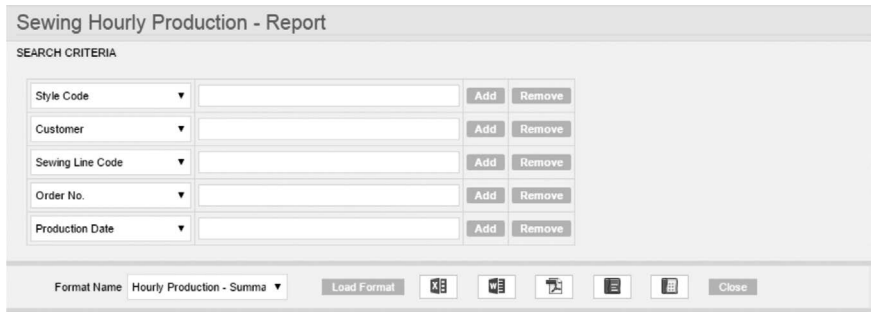
The screenshot shows the 'Operations MODIFY' form. The 'STEP HEADER' section includes: Operation Code (ST189), Description (TOP STITCH AT CROTCH), Operation Type (SEWING), Standard SAM (0.12), Is Active (checked), Style Code (KL0032-A5), and Remarks. The 'MACHINE TECHNICALS' section includes: Machine Type (SLNS - Single Needle Lock), Seam Length (CMS), and Rate Per Piece (0.65). Buttons for Submit, Cancel, and Close are at the bottom.

Source: Sylamb ERP by Fabyar Computing

Figure 3.6 Edit/modify page in ERP

Similar pages are available for all transactions.

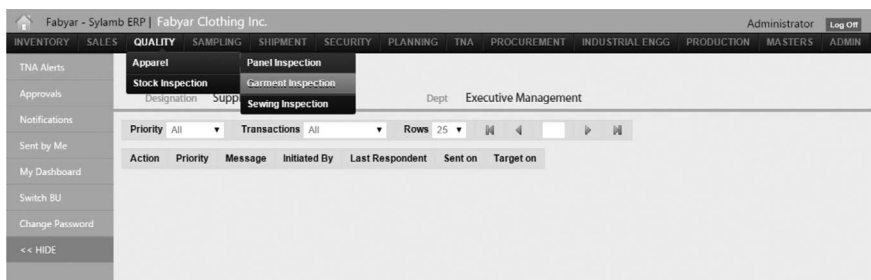
In case of reports, there will be a search page, and by clicking on “generate” button, the report can be generated. Figure 3.7 shows the search screen for a report named “sewing hourly production report.” The search criteria can be selected and a word or “pdf symbol” button that appears on the screen can be clicked to generated the report in the format chosen.



Source: Sylamb ERP by Fabyar Computing

Figure 3.7 Report search page in ERP

The modules are shown as menus on the ERP system either on top or on the sides. Figure 3.8 shows the modules in ERP software on the top, which can be clicked to view the related masters, transaction, and reports of that module. The various modules available in the ERP used in garment industry is shown in Figure 3.8, which include modules related to planning, production, procurement, and so on.



Source: Sylamb ERP by Fabyar Computing

Figure 3.8 Modules in ERP (garment ERP)

All the pages in the modules work in a user-specific manner. For example, for each and every master or transaction, based on the user role, “view or create or modify” access can be given. A purchase manager will be given “view” access to the production order, whereas production manager will be given access to create and modify production order, but HR personnel need not be given access to view production order. Similarly reports can be hidden for users who don’t require it. Such user-based controls make ERP a valuable information tool that can be used securely.

The transaction pages in ERP will have multiple options available for executing a transaction. It will have buttons to perform actions like continue, send for approval, cancel, reverse, authorize, approve, reject, enter notes, and so on.

3.3 Technical modules in ERP

3.3.1 Planning module

Functions

Planning module performs the following functions:

- Production operations are defined.
- Production capacity of each machine, its efficiency, and utilization are analyzed.
- T&A (time and action) activities are detailed.
- It involves activities of IE (industrial engineering) department whose job is to reduce the SAM value of operations and improving ergonomics to benefit workers.
- An order plan is created based on the delivery date by considering the machine availability.
- In the case of sewing department, based on the skill inventory, sewers are planned for each line and operation.
- In the case of spinning, count-wise plan is created, and based on the ring frame availability, the start dates of previous processes are planned.

Masters

The various masters or static data required for production planning are given as follows:

- Machine group master giving details on machine grouping
- Machine type, stating whether it is a ring frame or drawing machine
- Machine master with all machine details
- Operation master showing all the production operations
- Style master or sort master giving specifications of each sort or style
- Time and action activities master

- Planning group machine allocation master—this master is shown in Figure 3.9; here by selecting the section or the department, machines can be allocated to a particular group and priority can be assigned to each machine. For example, if the section selected is ring frame, it will show the group code and all machines under that group code. Then machines can be selected and prioritized as 1, 2, 3, and so on. While planning, when a particular group code is selected, it will first plan for the machine number with priority 1 and then move onto the succeeding machines.

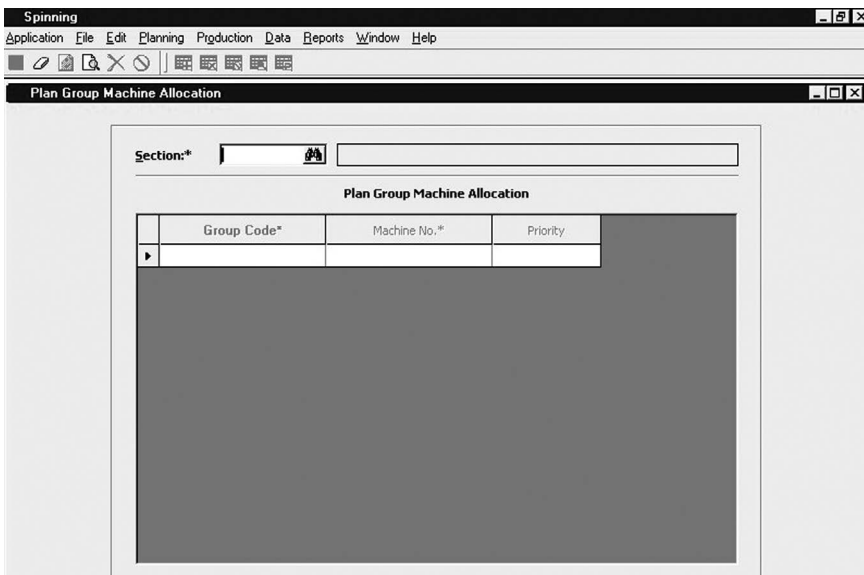


Figure 3.9 Plan group machine allocation master

- Shift master showing the various shifts in the company
- Operation bulletin master in the case of garment industry or sequence of operations master in the case of other textile processes
- Production capacity master

Transactions

Once all the data are available in the masters, then the planning activity is carried out using the transactions. The order planning page is opened and the order details from production order are taken. The start date and end date are

selected based on the delivery date. The planning can be done automatically by clicking on the “plan” button, as it plans the machines and provides the final report. Figure 3.10 shows a transaction in spinning industry on ERP where automatic planning can be done.

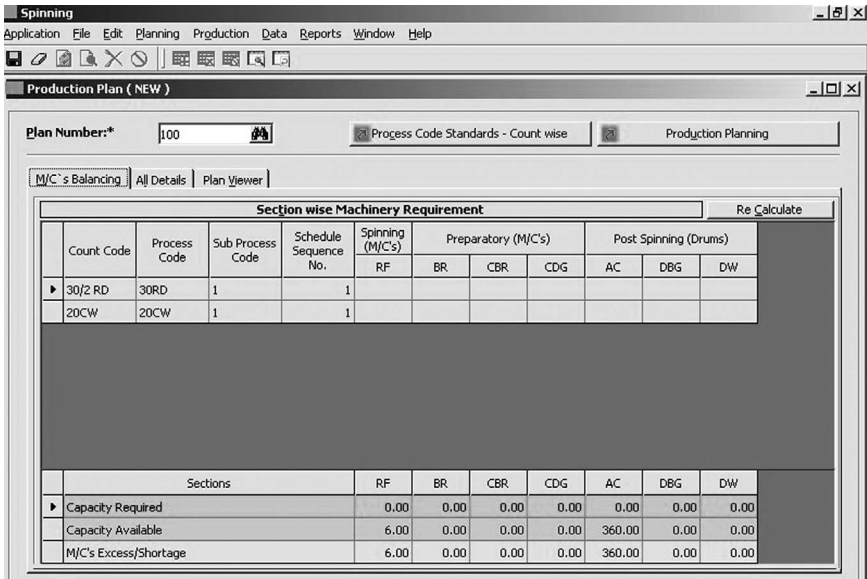


Figure 3.10 Automatic production planning

Figure 3.10 shows how automatic production planning can be done. By selecting the order number in the previous page and clicking on planning will open the page shown in Figure 3.10 describing the count details and the machinery to be used section-wise for the particular counts corresponding to that order. By clicking the “recalculate” button, re-planning can be done based on the logic input into the ERP system. During automatic planning, the system considers the suitability of machine based on its production capacity and efficiency.

Manual planning can also be done by using manual planning pages, and an example of manual planning done for garment industry is shown in Figure 3.11.

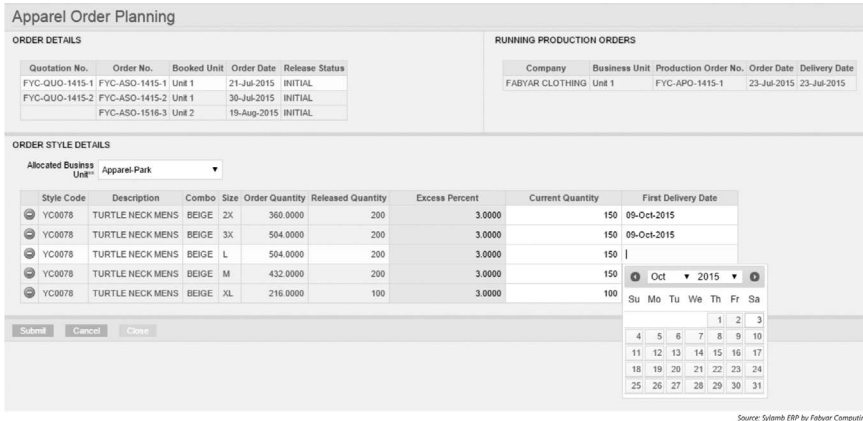


Figure 3.11 Manual production planning

The dates can be planned manually as shown in Figure 3.11 for different styles in different production units. Normally automatic planning is done, and in case where overriding is required, it is planned manually.

Reports

Based on the planning made, various reports can be obtained from ERP, including the following:

- Time and action plan
- Day-wise/week-wise/month-wise production plan
- Order-wise production plan
- Factory plan
- Count-wise or sort-wise or style-wise or batch-wise plan
- Cumulative production schedule report as shown in Figure 3.12

Production Schedule Report					
OrderNumber	Buyer	BuyerStyleNo	StartExFactoryDate	EndExFactoryDate	ScheduleStatus
WAS 0128	Lesley	ME 8734	10-Jul-14	10-Jul-14	INITIAL
WAS 0129	Brasky	BC 82435	14-Jun-14	16-Jun-14	INITIAL
WAS 0130	Sober	PR 28763	11-Jun-14	13-Jun-14	APPROVED
WAS 0131	Croper	54656	10-Jul-14	21-Jul-14	INITIAL
WAS 0132	Reaps	78732	10-Jul-14	10-Jul-14	INITIAL
WAS 0133	Laughs	82873	05-Jul-14	05-Jul-14	APPROVED
WAS 0134	Cosey	7208	13-Jun-14	16-Jun-14	APPROVED
WAS 0135	Cleves	CRIMSO72	25-Jul-14	25-Jul-14	APPROVED
WAS 0136	Pilan	DAHLI01	09-Jul-14	09-Jul-14	APPROVED
WAS 0137	Plome	PRO212	11-Jun-14	13-Jun-14	INITIAL
WAS 0138	Calat	CAL021	20-Jun-14	22-Jun-14	APPROVED
WAS 0139	Zorip	ZOR083	04-Jul-14	09-Jul-14	APPROVED
WAS 0140	Manda	MA 2345	04-Jul-14	09-Jul-14	APPROVED

Figure 3.12 Cumulative production schedule report

In this report, the status of the plan and dates of production are given for all the orders.

- Machine requirement report is shown in Figure 3.13.

ABC Exports
STITCHING 1
Machine Requirement Details

Batch Name: LINE A												
Stylewise Machine Requirement:												
Style Name	Buyer Name	Start Date	End Date	3T FIL	3TOIL	5TOIL	6TOIL	BTK/MC	DNLS	SNLS	PRSSING	
BABES AND GIRLS	I01	18 Mar 2014	22 Mar 2014	0	2	3	0	0	7	27	2	
MENS JACKETS-BLOUSON	.01	14 Feb 2014	18 Mar 2014	0	0	0	46	0	0	0	0	
BABES AND GIRLS	T101	24 Mar 2014	03 Apr 2014	0	2	3	0	1	7	27	2	
BABES AND GIRLS	I01	02 Apr 2014	12 Apr 2014	0	2	3	0	1	7	27	2	
GIRLS BOTTOMS-SKIRT	T01	18 Mar 2014	18 Mar 2014	0	0	0	0	0	0	0	0	
BOYS BOTTOMS (PANTS, SHORTS,...)	AT01	17 Mar 2014	17 Mar 2014	0	0	0	0	0	0	0	0	
ACCESSORIES-I	CO1	06 Apr 2014	09 Apr 2014	2	1	0	0	0	0	4	0	
MENS JACKETS-BLOUSON	.01	11 Mar 2014	13 Mar 2014	0	0	0	46	0	0	0	0	
BOYS TOPS	01	22 Apr 2014	02 May 2014	0	0	0	0	0	0	45	0	
				Maximum Machines Required								
				2	2	3	46	1	7	45	2	
Machine Status Details:												
Machine Status	3T FIL	3TOIL	5TOIL	6TOIL	BTK/MC	DNLS	FOA	PRSSING	SNCS	SNLS		
Repd Qty	2.00	2.00	3.00	46.00	1.00	7.00	53.00	2.00	1.00	45.00		
Difference	2.00	2.00	3.00	46.00	1.00	7.00	53.00	2.00	1.00	45.00		

Figure 3.13 Machine requirement details

In [Figure 3.13](#), it shows the various machine requirements for executing a particular order. It shows the sewing machines required, and these details are obtained from the transactions done on ERP.

3.3.2 Production module

Functions

The production module in ERP performs the following functions

- Production order creation
- Capturing the production data of each machine either through machine integration or through manual entry
- Stoppage data of each machine, including reason for stoppage and machine down-time
- Details of employee operating the machine
- Provides data on deviation from what was planned for production
- Efficiency and utilization of each machine
- Creating batches for production (batch for processing industry)
- Preparing job card
- Moving material between processes
- Providing work-in-progress (WIP) data in the production process
- Getting materials from stores to start production
- Returning excess material to store after production
- Reprocessing material if required (e.g., shade variation in dyeing)
- Job order and subcontract reconciliation
- Creating identification for each finished material and sending material for inspection (Doff numbers in weaving)

Masters

The various masters required for production module are as follows:

- Machine master
- Machine group master
- Department master
- Operation master

- Employee master
- Stoppage group master
- Stoppage code master
- Defect master
- Material master (count, yarn, sort, fabric, garment)

Figure 3.14 shows the material master for creating count in spinning ERP. A unique code is created for all the counts, and all the details related to it are entered in the master, such as raw material type, ply, end application, combing type, and so on. It can also be known whether that particular count is active or not. If active count box is not checked, then production order cannot be created for the count, as the count code will not appear in the drop-down menu on the production order screen.

The screenshot displays the 'Count Code' master form within the 'Spinning' application. The form is organized into two columns of input fields. The left column includes fields for Code, Description, Unit, Combing Type (set to 'Carded'), Raw Material Type, Default Process Code, No. of Mix, Resultant Count, Post Spinning Count, Cgunt Source, and Wt Per 20ft Container. The right column includes fields for Serial No., Single Count, Ply, Process (set to 'Waxed'), End Application (set to 'Warp'), Spinning Count, Weaving Count, CQ Count, and Gassed Count. At the bottom left, there is a checked 'Active Count' checkbox. At the bottom center, there are two buttons: 'Mix Details' and 'Count Details'.

Figure 3.14 Count master (material master)

1. Waste category master to categorize waste
2. Store master to transfer material to store
3. Unit of measurement (UOM) master to enter production

Production personnel need not be given access to all these masters, as they need only those data applicable for carrying out transactions related to production module.

Transactions

Production transactions done in ERP are as follows:

- A production order is created
- Based on the production order, production team prepares the store indent and receives material from the store through the store indent
- After receiving the material, production operation sequencing is done
- In the case of processing industry, job card and batches are created
- Issue of material to the first process is done using issue material to production page
- Then production schedule is entered based on the shift for the concerned machine or operation or line as shown in Figure 3.15. Order details are selected, and production schedule is entered for a particular line code. In the case of looms or ring frame, specific employees can be selected so that their efficiency can be calculated.

REPORT DETAILS

Company: Fabyar Clothing Inc.
 Business Unit: Unit 1
 Report No.:
 Report Date: 03-Oct-2015
 Sewing Line Code: L011
 Start Time: 12:00 PM
 End Time: 01:30 PM
 Quantity (PCS): 180
 Remarks:

PREVIOUS REPORT DETAILS

Start Time	End Time	Produced Qty (PCS)	Remarks
9:00 AM	10:00 AM	150	
10:00 AM	11:00 AM	130	
11:00 AM	12:00 PM	165	

ORDER DETAILS

Style Code: YC0078
 Style: TURTLE NECK MENS
 Production Order: FYC-APO-1415-1
 Customer: TRICO
 Fetch Quantity

COMBO SIZE DETAILS (Left)

Combo	Size	Quantity
WHITE	2X	368.000000
WHITE	3X	514.000000
WHITE	L	514.000000
WHITE	M	440.000000

COMBO SIZE DETAILS (Middle)

Combo: WHITE
 Size: L
 Produced Qty: 30
 Add Remove Change Cancel

COMBO SIZE DETAILS (Right)

Combo	Size	Quantity (PCS)
WHITE	2X	100
WHITE	3X	50

Source: Sytamb ERP by Fabyar Computing

Figure 3.15 Report production page in ERP

- After this, material is issued to next operation, and this process continues till the final product is obtained.
- The reason for issuing material between processes is to get the WIP data.
- Once the final process is concluded, the finished product is given an identification mark like doff number; these numbers are automatically generated using ERP system.
- Material is sent for inspection or testing.
- If results are acceptable, the material is sent for packing or else sent back for reprocessing. A new sub-batch is created and then reprocessed. Reprocessed production data are separately entered.

- Excess material or damaged material is sent to stores by creating a return note.
- If production schedule is to be entered for many machines, like in the case of hundreds of weaving machines, a cumulative production page is available, and stoppage data can also be entered machine-wise and stoppage code-wise.
- Materials given for subcontract or job work are also received, and an entry is made in the ERP accordingly. If job work is done for embroidery and that is fifth in the sequence of process, then the material is issued to stores after the fourth operation; against the production order, purchase team creates a job work PO and sends the material to the job worker by putting a delivery challan. Once the material is received, GRN is created and material is issued back to production to start the sixth operation in the sequence.
- Machine breakdown entry is entered in the respective pages available on ERP for further usage.
- Wastage generated can be entered in a consolidated entry screen or separately for each machine or operation.

Reports

The production module provides various reports for use by all stakeholders. Some of the reports generated include the following:

- Day-wise/week-wise/month-wise/year-wise production report
- Machine stoppage report
- Stoppage reason-wise report
- Waste-generated report
- WIP material report
- Operation-wise production report
- Labor efficiency and machine utilization report
- Production order report
- Job work and subcontract reconciliation report
- QC report or inspection report
- Store indent (part of inventory module)
- Return note (part of inventory module)
- Order status report

- Detailed production status report is shown in Figure 3.16. The report shows order-wise and style-wise quantity already produced and balance quantity to be produced.

Detailed Production Status Report

ABC Exports
STITCHING 1

Order Number	Style Number	Style Name	Combo	Ex-Factory Date	Operation	Quantity						
						Planned	Received	Reported	Balance To Issue	Issued	Rejected	Bal To Produce
Buyer: A.S												
166	TUG	SLV SHIRTS	JAMEL	06/07/2014	STITCHING 1	383	1	1	0	1	0	0
Buyer: PRODUCTS EUROPE												
338	16	long sleeve ruffled neck jacket	Grey	06/20/2014	STITCHING 1	1,207	1,202	1,202	0	1,202	0	0
Buyer: AS												
182	CA	GIRLS SKIRT	ETHNO	07/31/2014	STITCHING 1	1,517	4,056	1,372	0	1,372	0	2,686
Buyer: NAL S.A												
313	5Y	Women printed top	LE	06/05/2014	STITCHING 1	824	832	832	0	832	0	0
013	5Y	Women printed top	RDE	06/05/2014	STITCHING 1	824	832	832	0	832	0	0

Figure 3.16 Detailed production status report

- Planned versus actual production achieved report.

3.3.3 Quality module

Functions

Quality module is a very important module in ERP, as it helps in checking the quality aspects of products. The various functions of quality module are given as follows:

- Test results of each material done in different instruments are available.
- Inspection report of the fabric or garment inspected is available.
- All quality-related data are entered in the system and are made available.
- Various quality studies like ring frame-end breakage study and process studies can be obtained using data retrieved from the quality module.
- Raw material inspection can be done and products falling short of standards can be sent back to the vendor.
- It helps in vendor evaluation by providing sufficient data.
- Captures data from each testing instrument automatically, processes the same, and provides detailed information to the user.
- Gives data on the quality of product produced by each machine.
- Provisions are available to track the faults related to particular orders against which customer has raised complaints. It helps to find out the person who has tested the product, the person who has manufactured

the product, and results for each process so that the location or process where the defect has occurred can be found out.

- It also gives details about quality standards to be maintained, and notifies the concerned stakeholders about any deviation from the standards.

Masters

The quality module involves various masters that are used by various other modules and the list of masters used is as follows:

- Machine master
- Testing instrument type
- Testing instrument master
- Quality parameters master with count-wise or fabric-wise or garment-wise standards. The count-wise quality parameters entry is shown in Figure 3.17. In this master, when the section, machine group, and count are selected, the parameters can be selected. For example, if the parameter is CSP, it will come directly from the quality parameter master. CSP can be selected and the formula of multiplying count and strength can be entered in the formula field, and if any unit is there it is selected in the UOM field and the value of CSP for the particular count that is permissible can be entered in the value column.

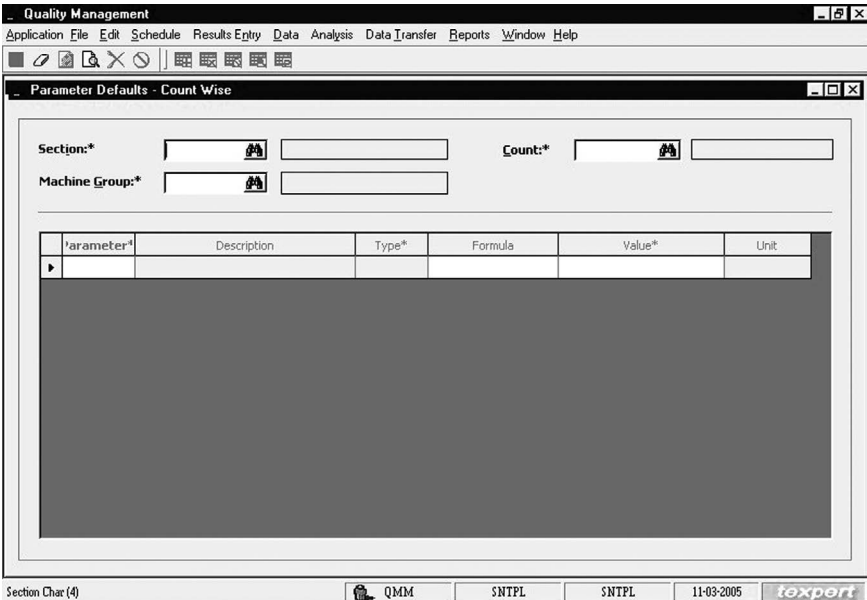


Figure 3.17 Parameter defaults: Count-wise master

- Instrument-wise quality parameters-mapping master
- Stoppage reasons master
- UOM master
- Process study master to enter the types of process studies carried out
- Quality certificate master
- Report remarks form to state what message needs to come when there is a quality deviation
- Lab test conditions master is provided to enter the test conditions and is shown in Figure 3.18. In this master, a unique code for test conditions, description, short ID, whether it is numeric data, field width required, and unit can be entered, and whether it is going to be used for lab tests or process studies can also be checked. During quality test results entry, the test conditions are displayed in the page for making entry. For example, the code can be given as RH. Description can be relative humidity. Short ID can be again RH. Numeric data can be checked. Field width can be set as 3 maximum. No need for decimals. Unit can be given as percentage. Applicability to both lab tests and process studies can be checked. This code RH will pop up on the transaction where test results are entered, and over there the user should enter the RH numerical value. It will not allow alphabets and decimals based on the master created.

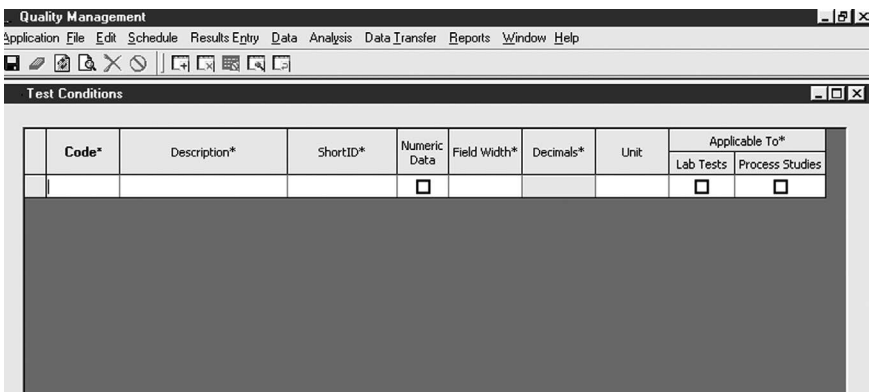


Figure 3.18 Test conditions master

Transactions

Once masters are created, transactions are carried out. Transactions are made automatically in the case of instrument integration. If test results from the

instrument are automatically transferred, reports can be directly viewed. If manual entries are made, then the following transactions are used:

- The quality test results of each instrument are entered in the test results entry transaction.
- Inspection results are entered in the inspection transaction.
- Process studies like end-breakage study are entered in the process study transaction page.
- Customer complaints are entered in the transaction page as shown in Figure 3.19

The screenshot shows a software window titled "Quality Management - [Customer Complaints (EDIT)]". The menu bar includes Application, File, Edit, Schedule, Results Entry, Data, Analysis, Data Transfer, Reports, Window, and Ę. The toolbar contains icons for file operations and navigation. The main form area is divided into several sections:

- Header Section:** Contains fields for Complaint No.*, Received on.*, Sent to Mill date*, Customer.*, Invoice No., Lgt No., Cgunt.*, Closed Date, and an Authorise button.
- Claim Section:** Contains fields for Quantity, UQM, Claim Value, and Currency.
- Complaints Section:** Includes tabs for Reply to Customer and Preventive/Corrective action. It contains fields for Samples Received*, Carton No., Nature of Complaint:*, Similar Complaints:, Analysis:, and Compensation Amount: with a Currency field.

Figure 3.19 Customer complaints transaction entry

In Figure 3.19, it is shown how a customer complaint is processed using ERP. Complaint details are entered in the transaction to obtain the required reports. Details such as complaint-received date, customer details, count details (yarn complaint in this case), invoice number, lot number, claim quantity, claim value, details of samples received, replies given to customer, and preventive/corrective action taken are all entered in this transaction.

- Testing schedule transaction
- Lab test reports are entered in the page as shown in Figure 3.20. The transaction page consists of all details such as date, time, sample number, test type, instrument in the header, and tab-wise details to enter the test details, test conditions, and test results of the test carried out. Along with the results, remarks if required can also be entered.

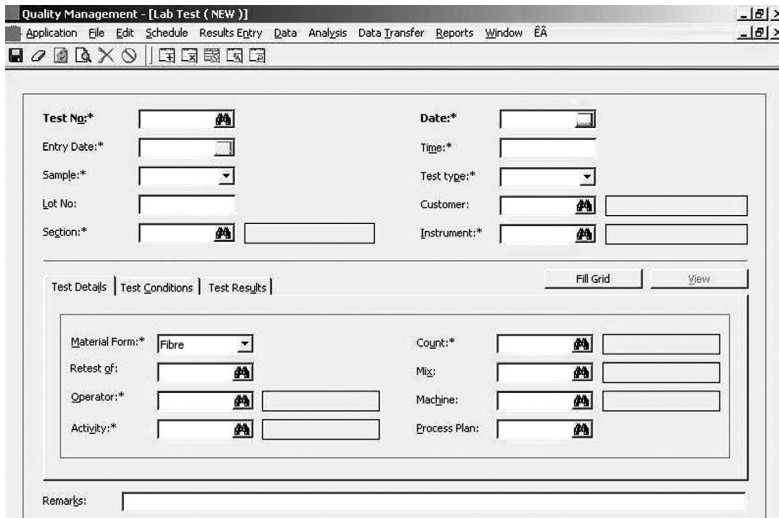


Figure 3.20 Lab test entry page

- Final inspection of yarn is carried out using the quality module. In the transaction page, Customer detail is selected, and based on it, all the packed cones are made available for inspection. Details such as number of packs to be opened, checked permissible limit of weight, and required weight of cones are entered along with package weight, cone weight, visual defects, wrapping results, lab test results, and process study results are entered and submitted.
- Lot-wise quality can also be tracked using the quality module transactions.

TEXTILE MILLS LTD.
 Lab Test Quality Comparison - Const Wise
 Department : Spinning Section : AUTO CONE MILL 1
 From Date : 25-02-2009 To Date : 25-02-2009
 Material : Yarn

Count Standard	16S CO	16S CO	20S CO	20S CO	20S CO	20S CO C1
Instrument :	QUANTUM EXPERT					
QFF		73.0		106.3		93.9
QFD		35.9		55.4		55.7
QBI	25.0	12.1	150.0	129.5	40.0	22.5
QHI	3.0	0.3	50.0	35.5	10.0	6.5
Instrument :	UT5					
Um	8.00	8.00	10.30	10.25	8.40	8.53
CVm	10.10	10.07	13.20	12.98	10.60	10.74
CVm 1m	3.40	3.04	4.10	3.25	3.45	2.95
CVm 3m	2.90	2.36	3.30	2.50	2.80	2.28
CVm 10m	2.40	1.64	2.50	1.68	2.35	1.66
IPI	7.0	7.5	123.5	158.5	12.0	13.5
Hairiness	8.20	7.90	8.05	7.87	7.95	7.93
sh	1.80	1.80	2.00	1.85	1.80	1.78
Instrument :	UTJ4					
RKM	18.0	19.8	17.0	16.7	17.5	17.0
Elong.	4.20	4.40	4.00	3.80	4.00	3.78

Figure 3.21 Lab test quality comparison report

Reports

The quality module offers a variety of reports, as these are very important reports that make or break the image of the company. If quality of goods is not up to the mark, then the materials delivered will not be accepted by the client. The various reports obtained from the quality module are given as follows:

- Inspection report
- Count-wise, style-wise, and sort-wise quality report
- Quality comparison report is shown in [Figure 3.21](#). The report shows count-wise quality for the test carried out in quantum expert. It shows the values for all the quality parameters given on the left and also highlights the deviations in the test results.
- Machine-wise quality report
- Final inspection report
- Defects report
- Defects analysis report
- Customer complaints report
- Date-wise/week-wise/month-wise quality report
- Order-wise quality report
- Cumulative quality report
- Individual lab test reports
- Individual process study reports
- Instrument-wise test report
- Lot-wise quality tracking report

3.3.4 Maintenance module

Functions

The maintenance module is useful for entering and taking care of all the maintenance activities of the machines. The functions are as follows:

- The preventive maintenance schedule is prepared automatically based on the master data.

- The machine maintenance details are maintained correctly.
- Data on parts change, repair, and replacement are tracked correctly.
- Breakdown reasons and time are noted and can be used for analysis.
- The reason for machine outage can be found out by proper recording of data.
- Critical activities related to maintenance can be found out.
- Maintenance of critical spare parts in stock is made easy.
- Preparing an accurate budget for maintenance and exercising proper control over the budget is possible.
- Cost of maintenance, including employee cost, can be captured.
- Value of the machinery can be ascertained using the maintenance module.

Masters

The various masters used in maintenance module are given as follows:

- Machine master
- Department master
- Machine category
- Maintenance activity master
- Mapping maintenance activity to machine or machine group master
- Machine breakdown category master
- Machine stoppage reason master
- Machine-wise activity master is shown in [Figure 3.22](#), where activity details are entered for each machine along with dates and frequency.
- All the major components, including their drawings, can be stored in the component master.
- Employee group master.
- Machine foreman group master.
- Machine location and department mapping master.
- Maintenance tools master or material master.

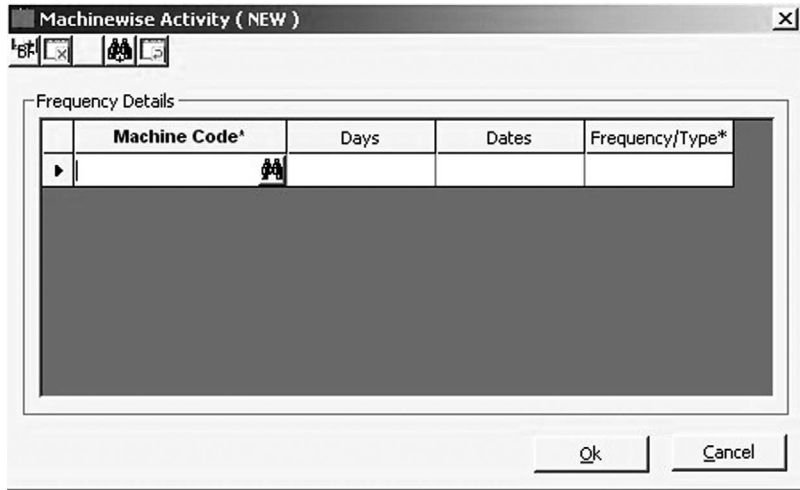


Figure 3.22 Machine-wise activity master

Transactions

Maintenance activities are entered using transactions available in the maintenance module. Details of it are given as follows:

- Creating a schedule for maintenance activity
- Preventive maintenance entry
- Employee allocation for maintenance activity
- Machine-wise maintenance entry
- Spare parts procurement from store through store indent
- Carrying out criteria-based maintenance and breakdown maintenance activity and entering it in ERP. Breakdown authorization approval form is shown in [Figure 3.23](#), where based on the department and date, all breakdowns are listed for the manager to view the reasons for breakdown, preventive actions taken, and then authorize the breakdown entry
- Entering the details of spare parts changed, repaired, and replaced
- Entering the cost for maintenance in the maintenance cost activity page
- Machinery annual maintenance contract (AMC)/calibration entry and authorization entry
- Machinery maintenance-pending entry
- Reactive maintenance entry is shown in [Figure 3.24](#), where activity description, date, machine number, and all other allied details are entered and saved for further data analysis

- Similar to the above, all other maintenance entry pages with details for items such as stoppage, parts, cost, and budget are available in ERP for entries.

Breakdown Authorisation - Approval

Department*: SPINNING From Date*: --

Section: CDG To Date*: --

Authorized By*: [] Authorise All

Activity Details						
Date	Machine No.	Breakdown Category Code	Breakdown Code	Nature of Problem	Corrective and Preventive Action	Co
[Empty Table Area]						

Department : Section : Entered By :

Shift : Reporting Time : Foreman Group :

Occurrence No : BreakDown Desn :

Remarks: []

Figure 3.23 Breakdown authorization form

Reactive Entry (NEW)

Department*: SPG Section: SPINNING Date*: 14-02-2005

Activity Details						
Section'	Breakdown Category Code	Activity Code	Activity Description	Machine No.'	Check List No.	Foreman Group
[Empty Table Area]						

Frequency : []

Figure 3.24 Reactive maintenance entry page in ERP

Reports

Using transaction data, different types of report can be generated and the following is a list of reports that can be generated:

- Breakdown time-loss report
- Breakdown machine-wise report is shown in [Figure 3.25](#). It shows machine-wise breakdown details with description and time
- Breakdown completed status report
- Breakdown code-wise report
- Breakdown item-wise report
- Breakdown division-wise report
- Breakdown consolidated report
- Meantime between failure report is shown in [Figure 3.26](#). The report shows the number of days taken between two failures in particular machines. It categorizes breakdowns as electrical, electronic, and mechanical and provides reports based on the category chosen.
- Meantime to repair report
- Periodic plan report
- All schedules report
- Schedules pending report
- Spare parts replaced report
- Schedule deviation report
- Budget plan report is shown in [Figure 3.27](#) highlighting the budget allocated for TFO section.
- Component life record report
- Machine history card
- AMC reports
- Periodic plan report is shown in [Figure 3.28](#), which gives schedule date and frequency of maintenance
- Maintenance completed status report

Maintenance - [Report Viewer] 26-09-2005 14:44:14

Application File Edit Schedule Breakdown History Card Components Data Report Window EÅ

Maintenance
ABC Textiles (Unit 1)

Breakdown - Machinewise

Department : Spinning Section : Carding
From Date : 01-03-2005 To Date : 30-09-2005

Section	Machine No.	Machine Description	Break Down Code	Description	Stopped Hrs	Attended Hrs
Machine : CD002 ...						
Carding	CD002	C 1/3 CARDING M/C NO :2	E305	CONTROL CONTACTORS	03:20	01:40
Carding	CD002	C 1/3 CARDING M/C NO :2	E314	LIMIT SWITCHES	05:10	04:40
Carding	CD002	C 1/3 CARDING M/C NO :2	E338	CONTROL CIRCUIT	01:40	01:10
Carding	CD002	C 1/3 CARDING M/C NO :2	E351	OTHERS	01:50	01:10
				Total :	12:00	08:40
Machine : CD003 ...						
Carding	CD003	C 1/3 CARDING M/C NO :3	E305	CONTROL CONTACTORS	01:10	01:10
Carding	CD003	C 1/3 CARDING M/C NO :3	E323	IDENTITY SWITCHES	03:40	01:40

Figure 3.25 Breakdown machine-wise report

Maintenance - [Report Viewer] 26-09-2005 14:59:33

Application File Edit Schedule Breakdown History Card Components Data Report Window EÅ

Maintenance
ABC Textiles (Unit 1)

Mean Time Between Failure (MTBF)

Department : Spinning Section : CBG
From Date : 01-12-2004 To Date : 22-09-2005

S.No	Machine No	Description	MTBF (Days)
Category :	Electrical		
Department:	Spinning	Section :	Carding
1	CD003	C 1/3 CARDING M/C NO :3	25
2	CD005	C 1/3 CARDING M/C NO :5	*
3	CD006	C 1/3 CARDING M/C NO :6	45
Category :	Electronic		
Department:	Spinning	Section :	Carding
1	CRO23	CROSROL CARDING M/C NO :23	*
Category :	Mechanical		
Department:	Spinning	Section :	Carding
1	CD003	C 1/3 CARDING M/C NO :3	25
2	CD005	C 1/3 CARDING M/C NO :5	20
3	CD006	C 1/3 CARDING M/C NO :6	36
4	CRO23	CROSROL CARDING M/C NO :23	19

Figure 3.26 Meantime-between-failure report

Maintenance - [Report Viewer] 07-10-2005 15:03:33

Maintenance
RBC Textiles (Unit 1)

Budget Plan

Department : Spinning Section : TFO
From Date : 01-10-2003 To Date : 07-10-2005

S.No	Activity	Description	Machine Occurance	Employee Cost	Component Cost	Emp. Component Cost	Production Cost	Total Cost
1	TF01	SCHRD...	529	952200.00	846400.00	1798600.00	1764035.14	3562635.14
2	TF05	SPIND...	82	241080.00	102500.00	343580.00	140329.06	483909.06
3	TF11	CRADL...	89	569600.00	111250.00	680850.00	425790.24	1106640.24
		CHECKING						
		Grand...		1762880.00	1060150.00	2823030.00	2330154.44	5153184.44

Figure 3.27 Budget plan report

Maintenance - [Report Viewer] 21-09-2005 15:07:58

Maintenance
RBC Textiles (Unit 1)

Preventive -Periodic Plan

Department : Spinning Section : All Sections
From Date : 22-09-2004 To Date : 21-09-2005

S.No	Activity Code	Description	Schedule Date	Frequency
1	RF11	SPINDLE OIL CHANGE / BREAK CLEANING	09-08-2005	6 - Months
2	RF12	TOP CLEARER CLOTH CHANGING	09-08-2005	12 - Months
3	RF14	GEAR WHEEL SERVICING	09-08-2005	2 - Months
4	RF19	VARIATOR ALIGNMENT CHECKING	09-08-2005	6 - Months
5	RF26	RING RAIL LEVEL CHECKING	09-08-2005	6 - Months
6	RF05	COTS BUFFING (FRONT ROLL)	11-08-2005	2 - Months

Figure 3.28 Periodic maintenance plan report

3.4 Commercial modules in ERP

3.4.1 Sales module

Functions

The sales module is known as merchandising module in the case of garment industry or as marketing module; many times it encompasses activities such

as marketing, sales, sampling, and costing. The functions of sales module include the following:

- Creation of quotation and sales order
- Preparing costing for the buyer order in liaison with planning department
- Finalizing the price of the order and executing samples if needed by linking the order with sampling department
- Marketing and getting orders from the customer
- Maintaining customer relations
- Sourcing material in case of accessories
- Ensuring smooth processing of order from creation till dispatch
- Overseeing order status

Masters

The various masters used in the sales module are given as follows:

- Customer master is shown in Figure 3.29. It shows details about customer, address, contact person details, and so on. Customer’s details can be entered and saved here.

Customer Master

HEADER DETAIL

Customer Code** MAXLOGICS

Name MAXLOGICS ENTERPRISES

Is Active

Company Fabyar Clothing Inc

Business Unit Unit 1

Primary Address 11/210-5, Dr. Nanjappa Road, Coimbatore

CONTACT DETAILS

Person Name	Mobile No.	E-Mail

Add Row

Submit Cancel Close

Source: Sylamb ERP by Fabyar Computing

Figure 3.29 Customer master

- Vendor master
- Sort/count/style/material master
- Shade master in the case of processing and garment industry
- Season master
- UOM master
- Currency master
- Employee master
- Style category master in the case of garment industry
- Department and company master, including business unit master
- Material part master (e.g., garment parts are entered for creating future transactions)
- Delivery terms master

Transactions

The sales module involves all activities related to creating sales order or buyer order. The various transactions carried out are given as follows:

- Quotation is created using create quotation page
- Costing for yarn, fabric, or garment is done using costing page
- MRL can be generated in the quotation page for creating sample
- Creation of sample order
- Delivery challan and packing and dispatching samples are done using their respective transaction pages
- Sample details are entered in the samples page
- Style details are maintained by the merchandising department
- Labdips approvals and tech-pack entries are made in sales module
- Sales order creation is done in sales module. [Figure 3.30](#) shows a sales order create page in ERP where all details, including style, order quantity, and all other details, are entered. [Figure 3.30](#) is self-explanatory as it shows all details normally entered for creating a sales order.

Source: Sylomb ERP by Fabyar Computing

Figure 3.30 Sales order creation page in ERP

- All material details are entered in the sales order create page and a sales order is created
- Sales order is approved and sent to planning department for production order creation through notifications and workflow available in the ERP system
- Buyer complaints are also entered in the corresponding transaction page

Reports

Sales module provides a variety of reports, particularly about buyer-wise details and a list reports that can be generated is provided as follows:

- Quotation report
- Sales order report
- Order-wise/cumulative/buyer-wise sampling report
- Order-wise/cumulative/buyer-wise costing report
- Sales versus quotation
- Order-tracking report
- Material requirement report
- Sales manager-wise sales report
- Sales efficiency report
- Profit realization report
- Style-wise order value report is shown in [Figure 3.31](#). In this report style-wise value of order and quantity are provided.

ABC Exports
Style Wise Order Values

Order Number	Order Date	Buyer	Department	Style Description	Ex-Factory Date	Order Qty	Order price	Currency	Order Value INR
3026	29-Apr-2014	ASK	CDS - BABIES	BABIES DRESS	14-Jul-2014	1,158	0.85	USD	672071.70
090	26-May-2014	BASES	CDS - BABIES	BABIES DRESS	14-Jul-2014	1,158	0.85	USD	627348.80
327	29-Apr-2014	LISAS	CDS - KIDS	GIRLS DRESS	14-Jul-2014	2,241	0.85	USD	1302257.15
69	27-May-2014	ELK	CDS - BABIES & KIDS	GIRLS DRESS	14-Jul-2014	2,241	0.85	USD	1214061.75
462	16-Jun-2014	PASTER	CDS - BABIES & KIDS	GIRLS DRESS	16-Jun-2014	4	0.85	USD	2324.80

Figure 3.31 Style-wise order value report

- Order-in-hand report
- Combo-wise shipment status report
- Order-wise trims usage report
- Material procurement status report

3.4.2 Procurement module

Functions

Procurement module takes care of all purchase activities. The list of functions enabled via procurement module is given as follows:

- Checking material stock availability and verifying the procurement requisition created by planning or production
- Getting RFQ from vendors
- Vendor evaluation and vendor rating
- Selecting a vendor and creating a PO
- Creating various POs for various purposes, including for job work, subcontract, process PO, and so on
- Creating vendor invoice after receipt of approval from inventory department that does a quality check on the material and confirms its quality to be good
- Based on vendor invoice, a debit note is raised in the procurement module; alternatively, vendor invoice is sent through workflow to finance to initiate payment process

Masters

Masters used for procurement module are provided as follows:

- Vendor/supplier master
- Material master
- Quality standards master

- Currency master
- Store master
- Procurement cycle master is shown in Figure 3.32. All procurement processes are entered in this master for later usage.

Procurement Cycle - Master

HEADER

Cycle Code**

Description

Is Active

CYCLE DETAILS

Sequence	Procurement Head	Material Code	UOM	Cost Per UOM
1	PURCHASE ▼	GUTI190001567	MTR	12
2	JOBWORK ▼	DYEVAT1009	KGS	8.5

Source: Sylamb ERP by Fabyar Computing

Figure 3.32 Procurement cycle master

- Procurement order terms and conditions terms master is shown in Figure 3.33, which can be edited by the client for updating the purchase (procurement) order report automatically. Different terms can be created for different purchases. There is no need for typing the relevant terms again and again.

Procurement Order - Terms & Conditions

HEADER

Purchase Term Code**

TERMS AND CONDITIONS

Sequence	Description
1	Vendor is responsible for inspections and testing of the GOODS for their quality as per the spec expected
2	Purchase Order No must be mentioned in all deliveries
3	Goods must be in good condition while arriving at our premises. Acceptance of goods is subject to the quality check during receipt
4	Delivery schedule should be strictly adhered to by the Vendor
5	Delay in delivery may lead to cancellation of the order with no repayment/compensatory liability from us.

Source: Sylamb ERP by Fabyar Computing

Figure 3.33 Purchase order (procurement order) terms master

- Tax-mapping master
- Material account-mapping master
- Material type and group master

Transactions

Transactions carried out via purchase module are listed as follows:

- Create RFQ
- Receive quotations and process RFQ
- Vendor evaluation based on RFQ
- PO creation—Various types of POs can be created, including purchase PO against order, non-order, general PO, PO for import, job work PO, subcontract PO, fabric order PO, and so on. Figure 3.34 illustrates how a PO is created. After entering all the header details shown in the report, the procurement requisition is selected by clicking on “Fetch PR Materials,” which will populate material details and cost can be entered and submitted. Upon clicking the “continue” button delivery details can be entered, and in the “PO taxes” tab, tax details can be entered.

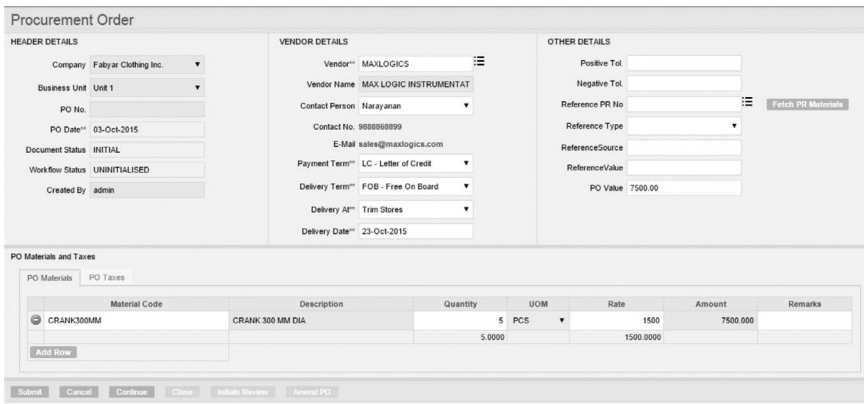


Figure 3.34 Create PO transaction

- Split PR as per requirement
- Process reconciliation
- Creating vendor invoice
- Creating debit note
- Transfer PR
- Create repeat POs

Reports

Using procurement/purchase module various reports can be obtained, which are as follows:

- RFQ
- RFQ pending
- Split PR
- Fabric process

PR status report is shown in Figure 3.35. The report shows the status of each PR and the quantity received against each PR. There is also an option to show the PO number related to the PR even if there are multiple POs.

The report also shows the status of PR, that whether it is closed or still remains open.

PR STATUS REPORT								
PR Number	Material Type	Material Code	Material Description	UOM	PR Quantity	Cumulative Ordered	Balance Quantity	PR Status
ASM 0001	FABRIC	M00182832	405*40S 132X72 100% COTTON WOVEN	MTR	30	30	0	CLOSED
			Poplin Solid Dyed					
ASM 0002	FABRIC	W1002833	405*40S 132X72 100% COTTON WOVEN	MTR	30	30	0	CLOSED
			Poplin Solid Dyed					
ASM 0003	FABRIC	L80890099	80S*80S 92X88 100% COTTON WOVEN	MTR	60	60	0	CLOSED
			VOILE SOLID DYED					
ASM 0004	FABRIC	A9807898	80S*80S 92X88 100% COTTON WOVEN	MTR	60	60	0	CLOSED
			VOILE SOLID DYED					
ASM 0005	FABRIC	A34523412	80S*80S 92X88 100% COTTON WOVEN Voile	MTR	60	60	0	CLOSED
			Solid Dyed 723 voile					
ASM 0006	FABRIC	A876543W	20S*16S 110X54 100% COTTON WOVEN	MTR	25	20	5	OPEN
			Canvas Solid Dyed BLACK					
ASM 0007	FABRIC	SA283452	20S*16S 110X54 100% COTTON WOVEN	MTR	25	20	5	OPEN
			Canvas Solid Dyed BOTTLE GREEN					
ASM 0008	FABRIC	ASD2832	20S*16S 110X54 100% COTTON WOVEN	MTR	35	25	10	OPEN
			Canvas Solid Dyed DARK GREY					

Figure 3.35 PR status report

- Vendor invoice report
- Material process follow-up report
- Order-wise status review report
- PO report for all types of POs created
- Cumulative PO report released to one vendor
- PO follow-up report
- Debit note

3.4.3 Inventory module

Functions

The functions of inventory module are as follows:

- Checking for material availability in stock
- Allocating available stock against work order or production order

- Creating GRN for the material received
- Quality checking of material received by quality team
- Once quality check is carried out and material quality is approved, material is updated in stock and the stock is allocated to its corresponding production order
- Issue note made on store indent received from production
- Material returned through a return note is updated in the stock and sent back to vendor if needed by creating a delivery challan
- Maintaining stock of all items and transferring stock between units
- Calculating total value of stock available with the company
- Using inventory techniques like EOQ, VED, and ABC to maintain optimum stock

Masters

The various masters used in the inventory module are as follows:

- Material type master
- Material category master
- Material group master
- Material master
- Store master is shown in Figure 3.36. In this master, the various stores in the company are created and saved.

The screenshot shows a 'Store Master' form with the following fields and values:

- Store Code: FABSTORE
- Description: Fabric Stores
- Is Active:
- Business Unit: Unit 1
- Store Type: MATERIAL STORE
- Can Purchase:
- Address: Floor 1, FYC Building, Coimbatore

Buttons: Submit, Cancel, Close

Source: Sylamb ERP by Fabyar Computing

Figure 3.36 Store master creation

Transactions

Transactions created using inventory module are as follows:

- Updating opening inventory
- The process of creating GRN is shown in Figure 3.37. Transaction shows the PO number against which GRN is received and, further, shows material details along with transport details. The “continue” button is clicked for sending the material for inspection. Once inspection is concluded, the GRN is approved. Even closed GRNs can be reversed if need arises. If material is already issued to production, GRN cannot be reversed.

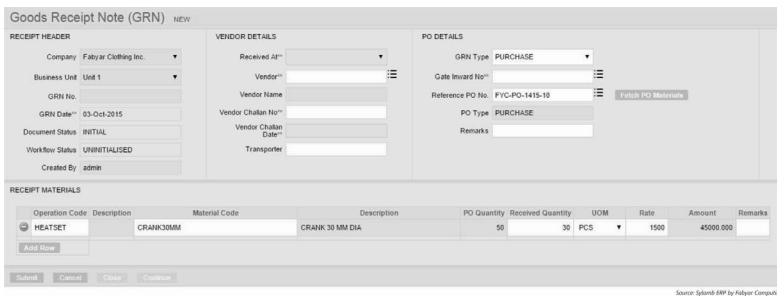


Figure 3.37 Creating GRN using ERP

- Material inspection transaction
- Stock update to the store
- Stock allocation to order
- The process of creating issue note and issuing the material against store indent or stock request note is shown in Figure 3.38. The issue note is created by selecting the stock-request note under references, and based on the indent, the order’s materials are shown. The issue note is sent for approval, and once approved by the appropriate higher authority, material is issued to production.

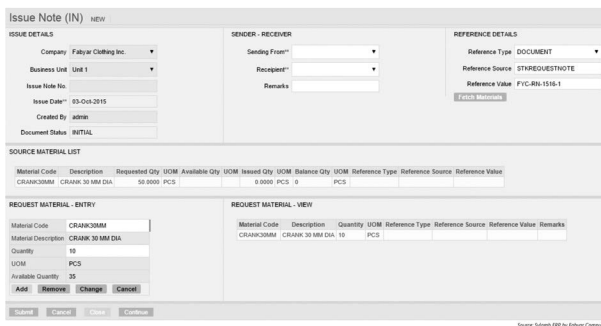


Figure 3.38 Creating issue note

- Stock transfer between units
- Stock adjustment
- Delivery challan for sending return stock to vendor
- Return note material update

Reports

Reports obtained from inventory module are as follows:

- Inward stock register
- Outward stock register
- Invoice pending register
- GRN report
- Cumulative GRN report
- A sample of issue note slip is shown in Figure 3.39. Details of material issued are shown in the issue note along with store details.

ABC Exports			
GENERAL ISSUE NOTE			
Issue No. :	5	Store :	FABRIC STORE
Issue Date :	11-Jul-2014	Issue Status :	APPROVED
Remarks :N/A			
Store Indent No	Requested By	Issued To Department	
16	Mam	PRODN SUPPORT-STORES	
Material Details			
Material Code	Material Description		Issue Qty UOM
427 TOR	20GG NA 100% COTTON KNIT Single Jersey Yarn Dyed		0.48 KGS
Total :			0.48

Figure 3.39 Issue note slip to production

- Pending inspection report
- Return note report
- Material returned from production report
- Cumulative reasons for return report
- Material stock report
- Material valuation report
- Stock ledger summary
- Stock ledger summary—material-wise report

- Vendor stock report
- Store-wise stock report
- Material loan report if given to other units as a loan
- Transit stock report
- PO pending report
- Return stock valuation report

3.4.4 Dispatch/logistics/export module

Functions

Functions of dispatch module include the following:

- Creating packing list
- Creating dispatch advice based on packing list
- Preparation of delivery challan
- Invoice preparation
- Preparing all statutory requirement documents for central excise, sales tax, and so on
- Preparing export documents in case of export and booking container, vehicle for transportation, and making appropriate entries to record transactions in ERP
- Preparing all export banking-related documents

Masters

Masters used in dispatch module are as follows:

- Custom exchange rate
- Packing code
- Material master for getting material details
- Port details master
- Service charge master
- Service charge category master
- Tax master
- Customer master
- Shipping agency master

- Delivery terms master
- Harmonized system (HS) code master (HS code for export) is shown in Figure 3.40

HS Code - Master

DETAILS

HS Code

Description

Active

Source: Sylamb ERP by Fabyar Computing

Figure 3.40 HS code master

- Bank charges master
- Interbank currency master
- Charge category master
- Export bank limits
- Finance account mapping master
- Duty drawback master is shown in Figure 3.41. Based on the HS code, the duty drawback incentive percentage is entered

Duty Drawbacks

HS Code**

Description

UOM

Serial No.**

PERIODICAL REVISIONS

	Effective From	Incentive %	Cap Value
⊖	10-Nov-2014	10	100000
⊖	10-July-2015	8	100000

Source: Sylamb ERP by Fabyar Computing

Figure 3.41 Duty drawback master

Transactions

Transactions carried out in dispatch module are as follows:

- Creation of packing list is shown in Figure 3.42. A packing list contains details of material to be sent to the customer. Based on packing list, a dispatch advice is prepared.

Source: Sylamb ERP by Fabyar Computing

Figure 3.42 Packing list creation using ERP

- Creation of dispatch advice
- Creation of delivery challan based on dispatch advice
- Creation or preparation of invoice
- Preparing tax documents
- Preparing bill of lading
- Entering data into duty drawback register
- Claiming duty drawback
- Duty drawback revision details are entered
- Creation of service invoice
- Selection of transport company and port and issuing orders to them
- Creating vendor invoice for transportation and shipping cost based on delivery terms
- Entry of letter of credit (LC) details like utilization

- Preparing bill of lading as shown in Figure 3.43 after receiving the same from the port authorities. Based on the invoice number; details such as document details, consignment details, shipping details, and agencies details are entered in their respective tabs and saved to generate the report.

Bill of Lading NEW

HEADER

Company: Fabyar Clothing Inc. (dropdown)
 Business Unit: Unit 1 (dropdown)
 Lading Entry No.:
 Entry Date:
 Report Status:
 Bill of Lading No.:
 Document Date:

DESTINATION DETAILS

Customer*: TRICO
 Address*: CA, USA
 Location*:

FREIGHT DETAILS

Freight Term: FOB - Free on Board (dropdown)
 Carrier No.:
 Trailer No.:
 Freight Term: Third Party (dropdown)

Consignment Details

Invoice No.	Date	Customer PO No.	Quantity	UOM	Value	Currency	Packing Lists Included	Gross Weight	Net Weight	Document Status	Workflow Status
FYC-INV-1516-108	5-Oct-2015	TCO10089	5500	PCS	56000	USD	FYC-PKL-2781,FYC-PKL-2782,FYC-PKL-2793	758.7	697.5	OPEN	APPROVED

Buttons: Submit, Cancel, Close

Source: Sykam ERP by Fabyar Computing

Figure 3.43 Bill of lading entry

Reports

Based on transactions created, various reports are obtained in this module and are listed as follows:

- Packing list
- Delivery challan
- Dispatch advice
- Invoice
- Duty drawback claim
- Duty drawback register
- Bill of exchange document
- Bill of lading document
- Vendor invoice
- Order report for shipping company
- Pending export documents report is shown in [Figure 3.44](#), which shows export orders pending for want of export documents

LIST OF PENDING EXPORT DOCUMENTS REPORT								
Order number		FYC-APO-1415-0023						
S.No	Goods Type	Goods code	Description	Style details	Size	Quantity	UOM	Rate
1	Garments	182	Mens turtle neck	3898	S,M,L	3500	PCS	8.03
2	Garments	234	Babies dungaree	3899	S,M,L	2000	PCS	9.23
3	Garments	176	Tank tops	3905	S,M,L	12000	PCS	5.40
4	Garments	245	A line frock	3907	S,M,L	3500	PCS	7.20
5	Garments	143	Romper	3908	S,M,L	4000	PCS	8.50

Figure 3.44 Pending export documents report

- Shipment advice register
- LC pending list
- Shipment payment follow-up
- Shipment status report
- Export cost report
- LC utilization detail
- Discounting bills report

3.4.5 Raw material management module

Functions

Raw material management module is mainly used in spinning mills to manage bales for obtaining optimum mixing. The various functions of the raw material management module are listed as follows:

- Getting data from the fiber testing instrument used for checking the quality of cotton bales produced
- All information related to bale quality is obtained
- Either standard distribution, normal distribution, or moving standard method is used to identify bales to be mixed for optimum mixing
- Various mixing codes can be generated with preset configurations and required quality
- Based on the code selected, bales will be identified by the module
- Bale details are fed into the module
- The module selects the correct mix and allocates bales for mixing to the mixing department
- It provides the logic of bale-laying for mixing

Masters

Masters used for bale management module are as follows:

- Company master
- Location master
- Variety master
- Vendor master
- Parameter master for entering bale quality parameters
- Parameter mapping master
- Main mix and sub-mix master
- Mixing criteria master is shown in Figure 3.45, where all the criteria for mixing are entered. The parameters of a particular mixing code with values are entered with priority.
- Allocation master
- Crop year master
- Material grade master
- UOM and currency master

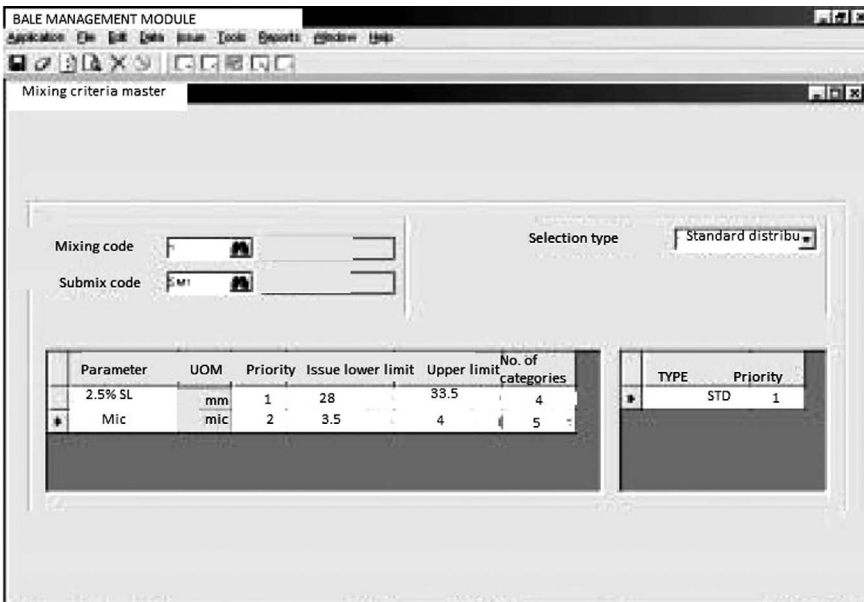


Figure 3.45 Criteria master

Transactions

The following transactions are carried out using bale management module:

- Parameter mapping to change the displayed names of various parameters provided in the module
- PO entry
- Receipt of goods
- Testing entry — lot-wise and bale-wise
- Based on test results, the module shows whether material adheres to the limits sent for the mixing code. Once these are checked and accepted, mixing allocation is carried out as shown in Figure 3.46. By selecting the mix, sub-mix, and grade, the “OK” button is clicked to allocate the mixing.

The screenshot shows a dialog box titled "Mixing Allocation". Inside the dialog, there is a section titled "Please Allocate the Mixing". This section contains three input fields, each with a small icon to its right. The first field is labeled "Mix Code:*" and contains the text "56s". The second field is labeled "Sub Mix:*" and contains the text "56_1". The third field is labeled "Grade:" and contains the text "Gr B+". Below these fields are two buttons: "Ok" and "Cancel".

Figure 3.46 Mixing allocation screen

- When the “OK” button is clicked as shown in Figure 3.46, the page asks whether to alternate if test results are not within limits. So alteration can be done and submitted for allocation in the alteration screen.
- Mixing transfer can be done using mixing transfer transaction
- Issue is made for the bales. Multiple issue options are available
- During issue, rows and columns can be specified to decide the required lay-down for bales
- The module provides lot and bale number as shown in [Figure 3.47](#) for lay-down. It also provides the position number and bale number or lot number for lay-down. Position can be interchanged by clicking the “interchange position” option. Using this feature, bale management can be handled.

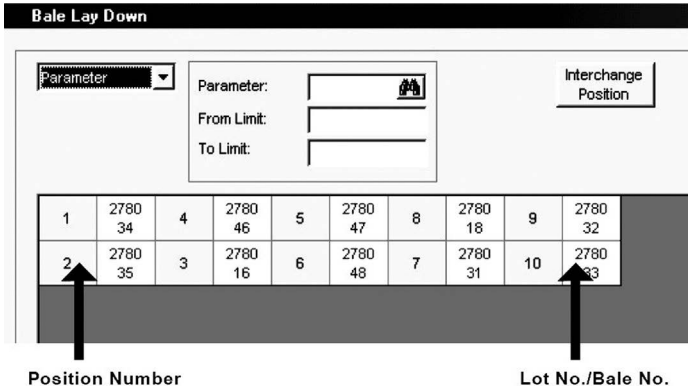


Figure 3.47 Bale lay-down transaction

Reports

The various reports that can be generated via this module are listed as follows:

- Lot-wise stock quality status report is shown in Figure 3.48. In this report, it provides details about lot number, total bales, tested bales, and average values of quality parameters.

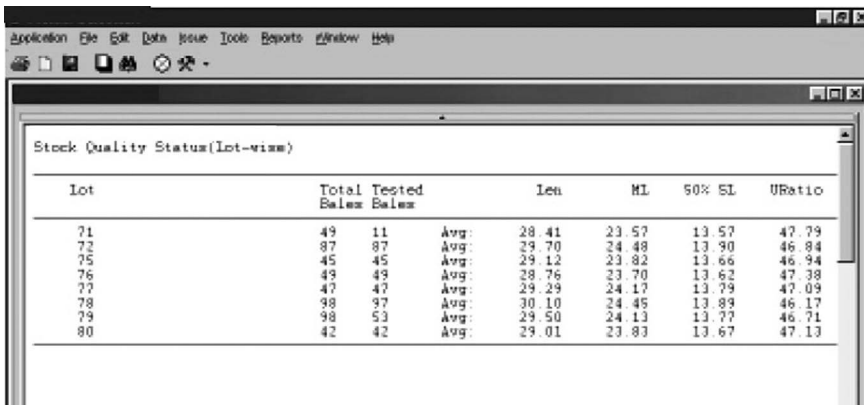


Figure 3.48 Lot-wise stock quality status report

- Bale-wise stock quality status report
- Stock quality distribution report
- Average mix quality trend report
- Mix quality history report
- Mix sheet report
- Mix histogram report

- Bale lay-down report
- Bale tag report
- Issue report

Similar specific modules can be designed based on industry requirement by customizing the ERP software. Premier Evolvics Private Limited is a pioneer in this area and has created a bale management software module named “Balesmart,” which is also sold as a standalone package; the module has complete control over bale management. This module is used by majority of spinning companies given its excellent features. There are a variety of software available for planning, for example, “razor plan” developed by Exilant and “fastreact” by Fast React Systems, which are used for planning in apparel industries. These software can be integrated with ERP and used or can be used as standalone packages as well.

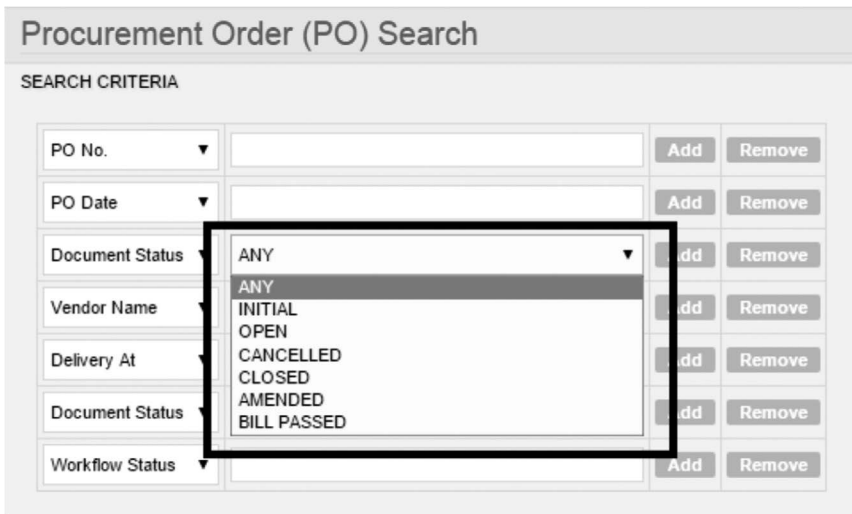
3.5 Workflow in ERP for textile and apparel verticals

The workflow in textile and apparel industries can be controlled and managed using ERP. Order status in the ERP program keeps changing in tandem with specific processes completed to manufacture the finished product; this feature helps to understand the order status and WIP. There are two types of statuses available in ERP. One is workflow status and the other is document status. Workflow status indicates whether a document has been approved or rejected, and document status indicates the stage of transaction. An example of PO is given to understand how the features, document status and workflow status, work.

- Once PO is created, its status is shown as “INITIAL” in the document status.
- In the next step, it is sent for approval, which is shown as “APPROVAL” in the workflow status.
- The concerned manager will get a message on his ERP user page when he logs in to approve the PO.
- If he approves it by opening and clicking on “approve” button after checking it, it will show the PO status as “APPROVED” in the workflow status and “OPEN” in the document status.
- If the manager rejects it by selecting “reject” button, status will show as “REJECTED” in the workflow status and the initiator will get a message on his ERP home page indicating rejection. The document status will show as “OPEN” once document is “APPROVED” or “REJECTED.”
- When the initiator makes necessary changes and sends again for approval, status changes to “APPROVAL” in workflow status, and after approval, PO status is shown as “APPROVED.”

- If the PO is amended for any reason, document status shows “AMENDED” and again document is sent for approval. So workflow status changes to “APPROVAL,” and after approval or rejection, appropriate status is displayed in the workflow status.
- Once all materials are received, checked, and bill passing is done, it says “BILL PASSED.” Once payment is made, the status is shown as “CLOSED.”
- The PO can also be cancelled at any stage, and the document status in this case is shown as “CANCELLED” if the PO has been cancelled.

With features available to readily track the status of each order, it is easy to find out the details of WIP in relation to each transaction. It makes simple the job of the user, manager, and everyone concerned. Figure 3.49 shows the PO search page with some of the status options that can be selected as part of search criteria used for searching specific types of POs. The approval status, which is also known as workflow status, is separately available for search; this is usually shown below the document status. In the workflow status, either “APPROVAL” or “APPROVED” or “REJECTED” statuses can be selected to search and view POs that are in that particular status.



Source: Sylamb ERP by Fabyar Computing

Figure 3.49 PO search page

Similar to the status options discussed previously, options are available for knowing the status of a production order or a batch order, where the status is shown as “PUBLISHED” once order is released to production. Then the status changes to “INPRODUCTION,” which further changes to different

status notifications/updates as material moves from one stage of production to another, such as “INSPECTION,” “PACKING,” “DISPATCH,” “TRANSIT,” “DELIVERED,” “PAYMENT,” and “CLOSED.” In the case of processing industry, for an activity like reprocessing, status appears as “REPROCESSED.” Similar status notifications are displayed for each transaction created in ERP based on the nature of such transactions. If a manager wants to know how many orders have been completed and goods delivered, by accessing the status “DELIVERED” page in the production order search screen he will be able to see only those orders that have been delivered. Hence, workflow in ERP leads to managing the flow of activities in the company. The status displayed shows the process in which a particular order is going through, and accordingly, the next suitable action is taken. The status will be shown in each transaction page for easy reference, and an example is provided in Figure 3.50. A sales order transaction is shown in Figure 3.50 with order status as “SHIPPED,” indicating that the order has been shipped, and the workflow status as “APPROVED,” indicating that this transaction has been approved by the authorities.

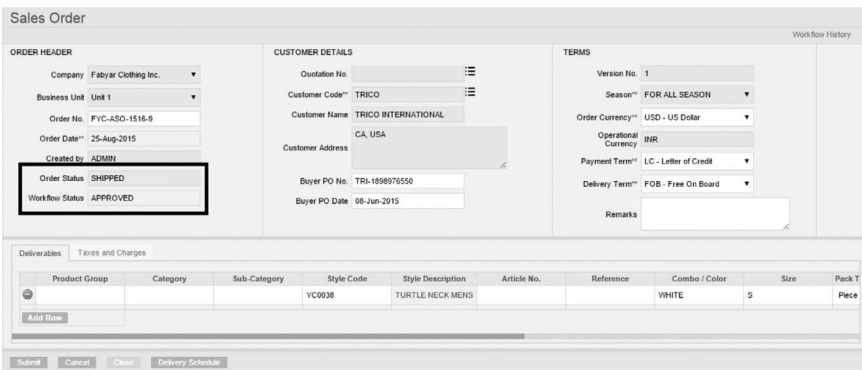


Figure 3.50 Sales order creation page showing status

3.5.1 Workflow process sequence

The process flow of an order in ERP using the workflow sequence is provided as follows:

1. Quotation creation and submission provide an action item for costing team to create costing.
2. After putting the cost, on submission, it generates action item for approval to costing manager.
3. On approval, it is sent to sampling department, if required for sampling.

4. If sampling option is not selected during quotation creation, then on costing approval, an action item is generated for quotation creator to check the costing and send quotation for approval to sales manager.
5. After approval, quotation is sent to buyer. If sampling is needed, a sample order is created by the sales team and an action item goes to sampling department for order execution.
6. If quotation is approved and buyer releases a PO, a sales order is created by the sales team and sent for approval to the sales manager.
7. On approval, it is sent as an action item to planning team to create production order
8. After production order creation, MRL or BOM and production planning is done and submitted.
9. Planning manager gets an action item for approving production order.
10. The production order along with production plan is sent to production team as information item so that they can check material availability and machine availability for production.
11. Material availability is also checked by the planning department and a PR is raised.
12. Once a PR is raised, an action item goes to purchase department to RFQ.
13. An RFQ is created and sent to vendors. On receipt of quotation, it is entered, vendor evaluation is carried out, and a vendor is selected.
14. PO is created and sent for approval to manager as an action item. Once purchase manager approves PO, it is seen as an information item by the purchase team so that they can take a print-out and send it to supplier.
15. Once material is received from supplier, GRN is created by stores department and forwarded as an action item to QC department.
16. After QC has been concluded and material quality has been approved, an action item comes to stores department to approve GRN and update stock.
17. Once GRN is approved, stock is updated and allocated to its corresponding production order, and an information item is shown in production department workflow.
18. Stores will get an action item to create vendor invoice, and upon creation of the vendor invoice, an action item is generated for

finance department to commence the payment process against the invoice.

19. Now production department raises store indent, and an action item comes to stores for issue of material.
20. Issue note is created and sent for approval to store manager. Once approved, material is given to production and production gets an information item that material is ready for taking.
21. Production department updates status regarding daily production achieved, and an information item with date and time is sent to the required stakeholders that production has been updated for a particular order.
22. During production, material is issued to each process or operation, and the concerned user gets an action item for entering details of materials sanction for his part of the operation in production.
23. After production, material is issued to inspection; materials get an action item in ERP to carry out inspection.
24. After inspection, packing team gets an action item to pack the material and transfer the same as finished goods to store.
25. Dispatch team gets an action item to create packing list and dispatch advice based on packing list.
26. After creating packing list, dispatch team gets action item to create delivery challan.
27. In the meantime excess raw material if any is returned to stores through a return note, and stores will get an action item for updating its stock and then its approval by the stores' manager.
28. After creating the packing list, the finance team or logistics team gets an action item to create an invoice, which is received by the managers/personnel in the logistics or finance team who are authorized to create an invoice.
29. In the meantime, once packing list is created, an action item is generated for action by the export/logistics team, who are responsible for creating export documents, tax documents, and booking vehicles and container.
30. Upon invoice creation, an action item is generated for the dispatch manager's approval. Upon approval, an invoice is printed and sent with the delivery challan along with the finished product to be dispatched to the customer.

All these information items and action items are shown in the home page when a user logs in using his user id and password. According to the user's designation, roles are set by IT department in ERP, and based on it access is given for viewing and approving. Configuration of user-based roles and workflow is possible in ERP. In the workflow process as discussed previously, wherever the word "department" is used, it means that the user corresponding to that department has the authority to either create or approve an action or information item based on the workflow configuration. Even workflow can be set in such a way that based on the user role or user screen rights there can be even three levels of approval. For example, one user role will be "purchase clerk" and, thus, the user will have access to the screen used for creating PO. The first-level approver of PO will be a purchase manager, and in ERP his role will be shown as "purchase manager." Once the purchase manager approves a PO, it goes for second-level approver, usually a general manager, whose role may be shown as "general manager" in the ERP, and finally it can go to the third-level approver, for example, managing director (MD), and his role may be set as "MD," and he is given rights for complete access to the ERP system. Numerous such configurations are possible in the ERP system. Even levels of approval can be based on the value of PO. If PO value is less than Rs.20,000, it may just go for one level of approval; if the value ranges between Rs.20,001 and Rs.50,000, it may go for a second-level approval; and for values above Rs.50,000, they may go for the third-level approval. The user whose role is "purchase clerk" will get access to all masters, transactions, reports, and workflow pertaining to that role. This completes the workflow process in ERP for all the actions carried out in a textile/apparel company.

Summary

The chapter clearly discusses the process flow in a textile/apparel company. The various options in the module, such as view, create, and modify have been explained in detail with illustrations. The technical and commercial modules available in ERP have been listed. Each of the modules has been explained, highlighting their functions, masters, and transactions associated with the module as well as reports that can be obtained from those modules. The module details cover the entire process flow in a textile/apparel company. The workflow processes handled through each of these modules are also described in detail. Modules such as HR module, finance module, asset management module, and utilities module are generic for all industries. As the functionalities of these modules are common for all types of industries, those are not explained in detail in this chapter. Modules of SCM, CRM, and PLM are latest developments in ERP and further developments in terms of added features of these modules are discussed in the next chapter. This chapter has covered all the modules required

for executing an order, starting from a buyer order to invoice, in detail for a textile/apparel company. It gives a good understanding of the overall process flow in the ERP system used in a textile/apparel company.

Note: Operations, processes, masters, transactions, reports, their entries, workflow, notifications, role-based user rights' configuration, static and dynamic data entries in each module, and the overall functionality of ERP system may vary based on the ERP software and its vendor. However, the functional aspects of ERP in a textile/apparel sector will be the same, irrespective of the software; for example, all ERP systems need not have different types of POs and thus different types of processes, purchase, job work, and subcontract. A company's ERP program can just have one type of PO to carry out all its associated activities. Therefore, the purchase activity remains same and how it is executed varies between different ERP software.

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Chapter 4

ERP in textiles and apparel

This chapter discusses the role of ERP in textiles and apparel. The various vendors and consultants of textile/apparel ERP are outlined. The chapter discusses how ERP is used to manage different operations and processes in spinning, weaving, processing in apparel and knitting industry. The related process sequence in ERP in the textile and apparel industry is detailed.

Keywords: ERP vendors, spinning, weaving, processing, apparel, ERP reports

4.1 Role of ERP in textile/apparel vertical

There is a great evolution in textile and apparel industry; in modern times, it has become a critical need for the industry to tackle unique challenges in the industry. Industries have begun to adapt themselves to the latest operational practices in meeting demands ushered in via globalization, amalgamations, diversification, vertical integration, and so on. Operations have become very complex in textile and apparel industry, particularly because of the uniqueness of operations where manufacturing and servicing go hand-in-hand, as majority of apparel retailers have their own manufacturing units and service has become a key aspect of business.

Textile industry is known for its versatility, and companies have resorted to using latest technologies that aid in making their work easier and efficient. Companies have started adapting business process reengineering (BPR) activities. They started implementing total productive maintenance (TPM), just-in-time (JIT), supply chain management (SCM), and a lot of inventory management techniques like EOQ, VED, and ABC analysis. The companies have adopted more scientific and innovative modern methodologies in functioning, including automation as the key aspect. Along with these, the focus on using IT and latest technologies has garnered increasing attention; with this changing trend, ERP has started playing a greater role in textile/apparel organizations. However, using ERP or its methodologies in textile and apparel industries has not been easy, as it has its own inherent complications. The main reason is that textile and apparel industries were mainly crafts-based in the earlier times, and only in the recent times have they become industry-based. This transfer has led to management exerting more control over the entire internal activities, functions, and processes, which in turn led to increases in efficiency, quality, and better cost savings.

The textile and apparel industry mainly looks for three aspects or three challenges and these are as follows: restructured, simplified, and more efficient

manufacturing systems; best possible inventory management; and a more organized, proficient, cost-effective transport or logistics system. Therefore, a better SCM is what the industry wants, along with better management of labor and capital, as this industry requires more labor and high capital due to higher machinery requirement and space. To have a better supply chain practice, manage labor and capital in the best possible way, and address complexities in business, using ERP has become inevitable for textile/apparel companies. This is the reason for significant increase in the number of companies opting for an ERP system. ERP enables companies to withstand competition in the longer run.

ERP's role in textile/apparel vertical has been significant in tackling increased complexities of business operations and ERP provides significant advantages:

- Reduced manufacturing time
- Increased coordination between all the operating units in a textile/apparel organization
- Reduced inventory and better management of stocks between different sub-units
- Increased productivity
- Reduced cost of logistics
- Better quality control of products at each stage of their process
- Reduction in production cost

As is already known, ERP is more data-oriented; it helps companies to decide the best possible business strategy, effective pricing strategy, real-time achievable business goals, demand management, better finance control, and identification of early trends in sales and marketing. The above points indicate that ERP is used by textile/apparel industries to produce high-quality product at a lower cost in best possible ways, as it helps with achieving reduction in expenses and overheads and by providing better control over each activity that leads to the finished product. Overall, ERP is used in the textile/apparel industry to monitor, control, plan, schedule, and analyze the whole manufacturing process by providing real-time access to information and managing the flow of work through different operation-specific modules and notifications and reports.

4.2 Vendors and consultants

Textile and apparel sector has been one of the most promising segments for ERP business. Some leading vendors of ERP have come out with an ERP solution catering to the textile and apparel vertical. There are many vendors

who have developed custom-based ERP only for textile and apparel industries. Some leading ERP vendors in the textile/apparel sector are listed as follows:

1. SAP: SAP, headquartered in Germany, offers SAP Business One for this sector and the product price ranges from US\$25,000 to US\$250,000, depending on the solutions offered. It works on service-oriented architecture (SOA) and can be used in for operations in multiple sites and multinationals where number of users range from 25 to 1,000. The various financing options available are lease, owner financing, and lease to own.
2. Microsoft Dynamics: Microsoft Corp., headquartered in the USA, has Microsoft Dynamics NAV product for textile/apparel sector with an upgraded version called 2013 R2. The price ranges between US\$8,000 and \$250,000 with lease, financing, and owner financing options. The user range is 5 to 750. Operations for multiple sites and for multinationals involving operation in 40 and more countries are possible. It works based on .NET architecture.
3. Oracle: Oracle's E-Business suite implemented thorough its partners is a globally proven business solution that helps reduce costs and manage business efficiently through its ERP solutions. Oracle is headquartered in the USA and has been a major ERP provider for textile and apparel sector.
4. Sage: Sage 300 ERP is used for textile/apparel sector with a user range of 2 to 450 and offered at a price range of \$150 to \$2,500 per user. Finance options include lease, owner financing, financing, and easy-pay. It can be used for operations from multiple sites and multinationals involving operations in 169 countries and works on a multi-tier architecture whose latest version was released in 2014.
5. Netsuite: Netsuite works on SAAS and multitenant architecture. It is in the price range of US\$10,000 to \$100,000 with subscription as financing option. It can be used for operations in multiple sites and multinationals with number of users ranging from 10 to any number. Netsuite is customized per client requirement.
6. Epicor: Epicor ERP version 10.00 is available at a price range of US\$4,000 to \$500,000. They facilitate operations in multiple sites and multinationals with lease, owner-financing, and lease-to-own financing options. Number of users can be between 1 and 2,000 and even more. Epicor's ERP is developed based on SOA.
7. Infor: Infor Visual used for the textile/apparel sector comes at a price range of US\$12,000 to US\$100,000 for its version 6.5.4. The finance options available are lease, owner financing, and lease to own with

multi-site and multinational operability. The number of users range between 5 and 500 and it is based on SOA.

8. Global Shop: Global Shop Solutions' version 2014.2 is available at a price range of US\$5,000 to US\$500,000 with lease and financing options. It works on SOA and supports multi-site multinational operations with number of users ranging from 3 to 300.
9. E2 Shop System: E2 Shop System (version 7.2) supports multinational and multi-site operations using client/server architecture with a user range of 1 to 300. The price range is US\$5,000 to US\$200,000 with financing and leasing options.
10. IFS: IFS Applications (version 8.0) is available at a price range of US\$300,000 to US\$2 million. The financing options available are lease and owner financing. The user range is between 40 and 5,000. It has multi-site and multinational functioning capability and is based on SOA architecture.
11. Vai: S2K Enterprise Solution is available with their latest version called version 5.4. Lease and financing options are available. The user range offered is 10 to unlimited for multi-site and multinational operability in the UK, CA, and Caribbean. This ERP system works based on SOA and offers cloud-based support.

Apart from these global ERP vendors, there are other major textile and apparel ERP giants who provide ERP solutions and are listed as follows:

1. Datatex ERP, implemented through Infinite computer solutions
2. Premier EvolvicsTexpert ERP
3. Ramco ERP
4. Intex ERP
5. eresource ERP
6. Zensar technologies
7. Axonsoft ERP solutions
8. Atna technology's ERP
9. Avon technology's ERP
10. Consona ERP
11. Aptean ERP
12. Reach Technology's ERP
13. Stage India
14. Lamp Software

15. Exilant's ERP Weaveit and Seamless
16. Shivit's ERP
17. Kalpatharu'sKalsofte ERP
18. Capterra
19. Apparel Connect ERP
20. Krisol ERP
21. AES Textile ERP
22. Wins Soft ERP

4.2.1 ERP consultants for textile/apparel vertical

Increased use of ERP in textile and apparel industry has given rise to lot of consultants emerging in the field of ERP selection, evaluation, implementation, and usage. The consultants are mostly senior managers or senior engineers who have prior experience in implementing ERP in textile and apparel sector and have gained experience in developing ERP software by providing domain knowledge. People with strong domain knowledge on ERP choose this field, and in today's context, consultants have started playing a major role. As many textile/apparel industries do not have knowledge on IT and ERP systems, they resort to hiring consultants to help and guide them in implementing ERP. Such consultants offer a host of services, ranging from evaluation of ERP systems, aiding in selection of ERP systems, price negotiations, performing requirement study analysis, assisting in ERP implementation process, and also providing assistance and guidance for continuous usage of ERP. Consultants charge customers on man-hour basis and charges are fixed based on the expertise and service provided.

4.3 Process flow in ERP for textile and apparel industry

The process flow of textile/apparel industry and different modules of ERP that were explained in the previous chapter will suit all kinds of industry. ERP has rapidly gained prominence in technical textiles sector as well, like home textiles. Technical textiles industries are growing and are likely to use ERP as and when a need arises. More customization in ERP will be required for those industries. In this section, more emphasis is given to state how the various processes of main verticals like spinning, weaving, processing, and garmenting use ERP for managing operations. This section deals with verticals' (spinning, weaving, etc.) specific transactions in order to give a better understanding about specific vertical users; for example, a weaving manager would be more interested in knowing the process flow and transactions for a weaving industry and so for each of the textile/apparel

vertical, the process flow of a company using ERP is explained. The flow of each vertical is divided into different sections that are as follows: sales, pre-production, production, inspection, packing, and dispatch. The procurement and inventory modules' functionality remains the same along with its process flows in ERP remaining the same across all the verticals. Different names are given for purchase orders (POs) based on the vertical, such as trims PO, cut-to-pack PO, fabric PO, yarn PO, fabric processing PO, import PO, and so in garment industry, but the process remains the same; hence, the earlier chapter can be referred for better understanding of the functionality of both these modules. The dispatch module process flow in ERP remains the same for all verticals; hence, it is explained in the spinning industry section that can be used as reference for all other verticals of textile industry.

Note. The name of the masters, transactions, reports, and details captured or available in those masters, transactions, and reports may vary across ERP products, but the functionality would be similar. Minor differences may be noticed in the process flows. A typical ERP process flow in the textile vertical is provided for better understanding of ERP used in textile and apparel verticals.

4.3.1 Spinning industry

The spinning industry is different from other verticals of textiles and apparel; many times the yarn that is spun is based on “made-to-stock” and not “made-to-order.” The spinning flow process starts from quotation creation if an order is received and ends after invoicing. It is explained as follows:

4.3.1.1 Sales flow

The sales flow of a spinning vertical in ERP is explained as follows and as illustrated in Figure 4.1:



Figure 4.1 Spinning sales flow in ERP

- **Create quotation**

The first transaction that takes place in spinning is creating quotation using ERP. Before creation quotation, the yarn details are updated in the material master and is called as count code or count master; hence, “COUNT” is created in the count code master as shown in Figure 4.2, along with a description of the count. The count code master consists of all details related to the count to be spun, such as unit, resultant count, ply, number of mix, spinning count, weaving count, and so on. After creating count code, in the quotation transaction page, the count code is selected and the quantity of yarn required is entered. The quotation is then sent via workflow for yarn costing.

The screenshot shows a window titled "Count Code" with a standard Windows interface (minimize, maximize, close buttons). The form is organized into two columns of input fields. The left column includes: Code*, Description, Unit*, Combing Type* (with a dropdown menu showing "Carded"), Raw Material Type*, Default Process Code*, No. of Mix*, Resultant Count*, Post Spinning Count, Count Source, and Wt Per 20ft Container. The right column includes: Serial No., Single Count*, Ply*, Process* (with a dropdown menu showing "Waved"), End Application* (with a dropdown menu showing "Warp"), Spinning Count, Weaving Count, CQ Count, and Gassed Count. At the bottom left, there is a checked checkbox labeled "Active Count". At the bottom center, there are two buttons: "Mix Details" and "Count Details".

Figure 4.2 Count code master

- **Yarn costing**

The costing page of the quotation is opened by the concerned personnel, and cost details of yarn, packing material, labor cost, spinning cost, overheads cost, and all other costs are entered. These costs can be fed into the cost master; according to the count code selected, if the same count code was run before, then costs can be populated automatically in the appropriate places for the user to verify and submit. The user can alter costs or enter modified values to arrive at the final cost of yarn. Costing is submitted, and through workflow it reaches the concerned manager for approval. The concerned manager approves cost and resubmits the info in the appropriate page, and a workflow is generated for the sales department personnel to verify all the details in the quotation and pricing. The sales head makes alterations to pricing if required and the final quotation is printed from the ERP system and sent to the customer.

- **Creating sales order**

Once quotation is approved by the buyer and an order is received, a sales order is created based on the buyer PO with all necessary details such as yarn specifications, delivery date, delivery details, and so on and submitted. Delivery details are entered in the delivery tab, including the port of shipment for export. The material details are taken from the material master and UOM; delivery terms come from UOM and delivery terms master. Sales order can be created by selecting the quotation. Once quotation number is selected, quotation details are automatically populated, and they can be modified based on the buyer PO and sales order can be submitted. Sales order can be created based on quotation or directly without a quotation. After creation of sales order, it is sent for approval through workflow to sales manager. Once approved, it goes to planning department for yarn order creation.

4.3.1.2 *Pre-production flow*

Figure 4.3 shows pre-production flow in spinning ERP, starting from the creation of production order to issue of material to blow-room. In the spinning industry, sometimes yarn is spun in “made to stock” category. In that case, a production order can be directly created without a sales order, and later when the material is sold, sales order can be created and the material produced can be assigned to the sales order and dispatched.



Figure 4.3 Pre-production flow in spinning ERP

• **Create production order**

Production order is created based on sales order, including all relevant details such as customer order number, sales order number, process, operation to be carried out, production date, and quantity. The start date and end date of production will be added to the production order. If quotation was not created, after creating production order, planning department defines process code and process plan code; these codes are shown in [Figure 4.4](#) and [4.5](#), respectively. The process code is created to enter details about the various processes to be carried out and enables process linking. The number of processes to be carried out is entered in this master. The process plan code is created for planning purpose. For every order, a process plan code is created to state the mix to be selected and align all the codes such as quality code, packing code, and identification code to the process plan code. Before creating production order, process plan code is created by planning department. During production order creation, process plan code is selected; based on it, all details related to process, quality parameters, operation specifications, packing and details are auto-populated. It makes the process easy, doing away with redundant data entry. Once production order is created, it is sent for approval; after approval, production lots are created. Along with production lot creation, planning department gets a workflow to plan the schedule for spinning along with machine details, start date, and end date. These data are entered against production order and submitted for the approval of planning manager and production manager.



Figure 4.4 Process code master

The screenshot shows a software interface titled "Process Plan Code". It contains several input fields and a table:

- Process Plan Code:** [Field]
- Description:** [Field]
- Count Code:** [Field]
- Quality Code:** [Field]
- Picking Code:** [Field]
- Identification Code:** [Field]
- Process Code:** [Field]
- Section Assignment:** [Button]

Below the fields is a section titled "Mix Code Details" containing a table:

	Mix Code	Sub Process Code	Sub Mix Code*
▶			

Figure 4.5 5 Process plan code master

- **Create production lots**

Using lot creation page, production lots are created by selecting the quantity of yarn that needs to be produced in one lot. The lot creation will have details such as mix required for the lot, operation details, process parameters, required quantity, and all other technical specifications required for spinning.

- **Request and issue material for blow-room**

After creating production lots, production department requests for raw material (fiber) by creating store indent. In the store indent page, count code, mix code, and description are selected and the required quantity gets populated automatically based on the lot size. It can be changed if required and the store indent is submitted. On submission of store indent, a workflow is generated for production manager to approve and then it reaches stores. Stores issues material by creating an issue note against the store indent submitted. The material is released to the process “blow-room” on the issue page. Once material is received, production starts. If production is not done based on made-to-order, then individual production orders can be created for each count and production can be reported based on the count code.

4.3.1.3 *Production flow*

Figure 4.6 shows production flow in spinning using ERP, starting from blowroom production entry to issuing cones to stores.

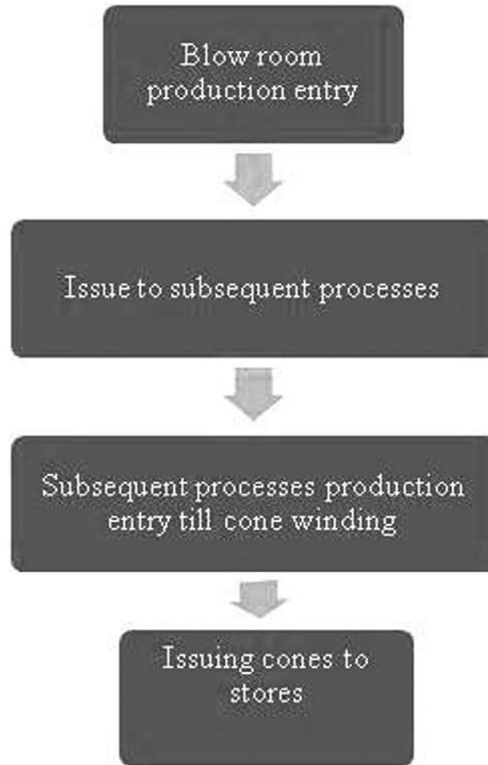


Figure 4.6 Spinning production flow in ERP

- **Blow-room production entry**

Fiber is received from stores and mixing is done. Production is carried out in the blow-room and production details are entered in ERP. Once production details are entered, material is issued to carding.

- **Issue of materials to subsequent processes**

Material is issued to the carding department, using “issue to next process” screen, which is done by selecting the lot number for which blow-room production is entered. Similarly, after entering production details for each process, material is issued to the next process.

- **Subsequent production processes entry till cone winding**

Production entry is done for each and every process starting from carding to cone winding along with stoppage and waste details. For each process, based on the output, a production entry is made. The production entry in cone winding is shown in [Figure 4.7](#), where the number of cones produced is entered along with the machine number, employee code, drum numbers, idle drums, and so on. Cones are labeled and doffed

cones are sent for random quality check. During the production process, quality checks are carried out at each stage, such as checking the hank, U%, count, and imperfections, by using various instruments; quality inspection data are entered in the ERP quality module.

The screenshot shows a software window titled "Production - Weight (NEW)". At the top, there are input fields for "Shift:*" (value: 1), "Date:*" (value: 24.03.15), and "Section:*" (value: GAS). A "Stoppage Details" button is also visible. Below this is a table titled "Weight Details". The table has the following columns: Machine No.*, SIDE*, Count Code*, Employee Code, Process Plan Code*, Process Details*, Identification Code, Drum Nos, No. of Drums*, Idle Drums, No. of Cones, and St v. The "No. of Drums*" column contains the value 480. Below the table, there are input fields for "Description:", "Make:", and "Model:". The table is mostly empty, with only one row of data visible.

Machine No.*	SIDE*	Count Code*	Employee Code	Process Plan Code*	Process Details*	Identification Code	Drum Nos	No. of Drums*	Idle Drums	No. of Cones	St v
								480			

Figure 4.7 Production entry using Spinning ERP

- **Issuing cones to stores**

Cones are issued to stores for quality check and packing using issue screen in ERP. All the produced cones are issued to stores.

4.3.1.4 *Inspection and packing*

The inspection and packing flow is shown in [figure 4.8](#)

- **Inspection**

Cones are randomly inspected, and an inspection number is created in the ERP inspection page. Against the inspection number, quality details of yarn are entered, which are based on tests done using various instruments. Details are obtained automatically from instruments if automatic data transfer facility is enabled. If cones are rejected based on deviations found from quality inspection report, they are sent as rejections to stores, using “issue to store” screen and selecting “issue type” as “rejection.” The remaining cones are issued to packing using “issue to packing” page. The issue screen can be the same, and the issue type, like issue to packing, issue to rejection store, and issue to process, can be selected as per the requirement (see [Figure 4.8](#) for details).



Figure 4.8 Inspection and packing flow in spinning ERP

• **Packing**

Cones are packed in cartons and carton numbers are generated using “carton packing” page. The carton weight as per packing and all other related details are entered and are saved. The material is then issued to finishing store to get it ready for dispatch. The carton packing is shown in Figure 4.9. It has all details related to packing, including net weight and number of units per pack. The packing code is referenced in the process plan code and process plan code is referenced in the production order; hence, just by selecting the packing code, all other order details can be obtained in the reports.

The screenshot shows the 'Carton Packing' window with the following fields and sections:

- Packing Code:*** [Input field]
- Packing Type:*** [Dropdown menu: CARTON]
- Type SI No.:** [Input field]
- No Of Units Per Pack:*** [Input field]
- Description:*** [Input field]
- Packing Unit (Cone/Cheese):** [Input field]
- Unit:*** [Input field]
- Packing Unit Tolerance:*** [Input field] % [Input field]
- Net:*** [Input field]
- Net Tolerance:*** [Input field] % [Input field]
- Gross:*** [Input field]
- Gross Tolerance:*** [Input field] % [Input field]
- Dimension (H*L*W) in mm:** [Input field]
- Special Instructions:** [Input field]
- Packing Details** section containing a table:

Serial No.	Carton numbers	Description	Unit	Quantity
1				

Figure 4.9 Carton packing page in ERP

- **Packing list creation**

Based on boxes packed, using the packing list creation page, the boxes that are to be sent together to the customer are packed and the list of boxes available under each packing list is saved in this page. The packing list number generated is provided to dispatch department through workflow for dispatch advice creation.

4.3.1.5 Dispatch

The dispatch module process flow in ERP remains the same for all the verticals of textile industry and are illustrated in Figure 4.10.



Figure 4.10 Dispatch flow in ERP

- **Dispatch advice creation**

Based on delivery schedule to customer, dispatch advice is created using dispatch advice creation page in ERP. The number of carton boxes for yarn and garment and number of bales in the case of fabric to be sent along with date are available in the dispatch advice. In some companies, based on dispatch advice, packing list is created; in some companies, packing lists are created to be a part of the dispatch advice. Based on

requirements, dispatch advice or packing list can be created for any order.

- **Delivery challan**

Delivery challan is created based on dispatch advice using the “delivery challan creation” page. Details of materials to be sent are entered in the delivery challan along with all other required details and saved. The delivery challan can be printed, signed by a competent authority, and sent along with the material.

- **Invoice preparation**

Invoice is prepared using the “create invoice” screen. In this page, all details of material, invoice value, and delivery address are entered and saved. Invoice can be printed, signed by the competent authority, and sent along with material to be dispatched to customer.

- **Gate pass preparation**

Gate pass is prepared for material to be sent out. The “gate pass creation” screen is used for gate pass creation. Material details, customer details, and delivery address are entered and printed to be sent along with the material. Only when a gate pass is provided, the company security permits the material to be loaded onto the truck and sent out.

4.3.1.6 *Related masters, transactions, and reports*

The spinning-specific masters, transactions, and reports are provided as follows:

The masters are count code, process code, process plan code, identification code, packing code, cop content master, count change request slip, count section mapping, section standard parameters mapping, and so on. Transactions include consolidated waste entry, cop content entry, idle drums entry, frame plan, and so on. Reports specific to spinning are count change requisition slip, waste generation report, count-wise comparison of production, waste, stoppage, pending inspection and packing report, instrument test reports, and so on.

4.3.2 Weaving industry

The weaving process starting from quotation creation to invoice creation are discussed. The sequence of activities is explained in detail under the following headings.

4.3.2.1 *Sales flow*

The sales flow of weaving department is shown in [Figure 4.11](#).



Figure 4.11 Sales flow in weaving ERP

- **Create quotation**

The first transaction that takes place in weaving is creating quotation using ERP. Before creating quotation, fabric details are created in the material master, which is called as “sort” in the industry and so “SORT” is created in the fabric master along with composition and design data. After creating these, in quotation transaction page, the material code (sort) is selected and the quantity of material required is entered and the quotation is sent via workflow to initiate sample analysis. The material fabrics (sort) master is shown in Figure 4.12. In most cases, customer sends a sample or gives specifications for the fabric required, such as yarn count, weave type, EPI, and PPI.

Material (Fabrics)

HEADER

Material Code** TW2/2_80_60_10285_WHITE

Description** TWILL 2/2 80*60 10285 WHITE

Parent Material Group** WOVENFAB

Group Description

Is Active

UOM MTR

Remarks

DETAILS

Properties Composition Data Design Data

Property Code	Description	Value
EPI	Ends Per Inch	80
PPI	Picks Per Inch	60
COLOR	Color	WHITE
DESIGN	Design Code	TW2/2
HSCODE	HS Code	610602
GREIGE_FAB	Greige Fabric	Yes
DYEING_TYPE	Dyeing Type	PIECE DYED

Generate Material Code

Submit Cancel Close Create New

Source: Syllamb ERP by Fabyar Computing

Figure 4.12 Material (fabrics) master

- **Sample analysis**

The sampling department analyses the sample if provided or using the specifications provided enters the yarn details. Yarn codes are created in the yarn master and the codes are selected in the screen for sample analysis. Sample analysis is indicated in the quotation transaction itself. After selecting the yarn codes for warp and weft separately in the ERP and entering of EPI, PPI, wastage percentage, and type of weave, BOM (bill of materials) is generated. The weight of warp, weft, and total cloth based on the order quantity are calculated and displayed along with wastage percentage. The formula for calculation is programmed in the ERP system and this way the job of sampling team becomes easy. In some companies, the BOM generation activity is handled by a dedicated planning department. Once BOM is generated and if any changes are required in the quantity, changes are incorporated into the BOM by manually altering it and the revised BOM is submitted. Once the BOM is submitted, quotation goes as a workflow to costing department for calculating costs.

- **Costing of the fabric**

The costing page of quotation is opened by the concerned personnel, and cost details of yarn, packing material, labor cost, weaving cost, overheads, and all other costs are entered. These costs are fed into the cost master, and according to the fabric specification and yarn code selected, if the same sort was run before, costs can be populated automatically in the appropriate places for the user to verify and submit. The user can alter costs or enter revised costs and then arrive at the final cost of fabric. Costing is submitted, and, through workflow, reaches the manager for approval. Once manager approves costs and submits, a workflow is generated for sales department personnel to verify all the details in the quotation and the pricing. The sales head can make alterations to pricing if required and a final quotation can be printed from the ERP system and sent to the customer.

- **Creating sales order**

Once quotation is approved by the buyer and an order is received, a sales order is created based on the buyer PO with all necessary details related to fabric specifications, delivery date, packing details, and so on and submitted. Delivery details are entered in the delivery tab, including the port of shipment for export. Material details are taken from the material master and UOM. Delivery terms come from UOM and delivery terms master. Sales order can be created by selecting the quotation. Once quotation number is selected, quotation details will automatically populate the screen; they can be modified based on the

buyer PO received and sales order can be submitted. Sales order can be created based on quotation or directly without a quotation. After creation of sales order, it is sent for approval through workflow to sales manager. Once approved, it goes to planning department for production order creation.

4.3.2.2 *Pre-production flow*

Figure 4.13 shows pre-production flow in weaving ERP starting from creating production order to issue of yarn for warping. In weaving industry, sometimes fabric is woven in “made to stock” category. In that case, a production order can be directly created without a sales order and later when the material is sold, a sales order can be created and material produced can be assigned to the sales order and dispatched.



Figure 4.13 Pre-production flow in weaving ERP

- **Create production order**

A production order is created based on the sales order with all details related to the customer order number, sales order number, process, operation to be carried out, production date, and quantity to be produced. The start date and end date of production are mentioned in the order.

If a quotation has not been created, after production order creation, planning department defines fabric specification and generates BOM. If a quotation was created, BOM information and fabric specifications are obtained from quotation. It makes the process easy and avoids unnecessary data entry. Once production order is created, it is sent for approval; after its approval, production lots are created.

- **Create production lots**

Using the “lot creation” page, production lots are created by selecting the quantity of fabric to be produced in one lot. The lot creation will include details, such as yarn required for the lot, operation details, number of warping ends required, and all other technical specifications required for weaving.

- **Request and issue yarn for warping**

After creating production lots, production department requests for yarn by creating a store indent. In the store indent page, yarn code and description are selected and required quantity populates the screen automatically based on the lot size. It can be changed if required and the store indent is submitted. On submission, a workflow is generated for production manager to approve and after approval reaches stores. Stores team issues material by creating an issue note against the store indent. The issue is done to the process “warping” in the issue page. Once material is received, production starts.

4.3.2.3 *Production flow*

Figure 4.14 shows the production flow in weaving using ERP, starting from warping production entry to issuing doffs to store.

- **Warping production entry**

The warping production is entered against each lot created. The lot is selected and the beam number is selected from the warping beams master. The warping machine number is selected, and production details are entered along with the selection of employee working with the warping machine. Once warping beam is created, beams are issued for sizing.

- **Issue to sizing**

Warping beams are issued to the sizing department using the “issue to next process” screen by selecting the beam number for which warping production is entered. Only beam numbers for which warping production is reported will appear in the “issue to next process” page for issue.

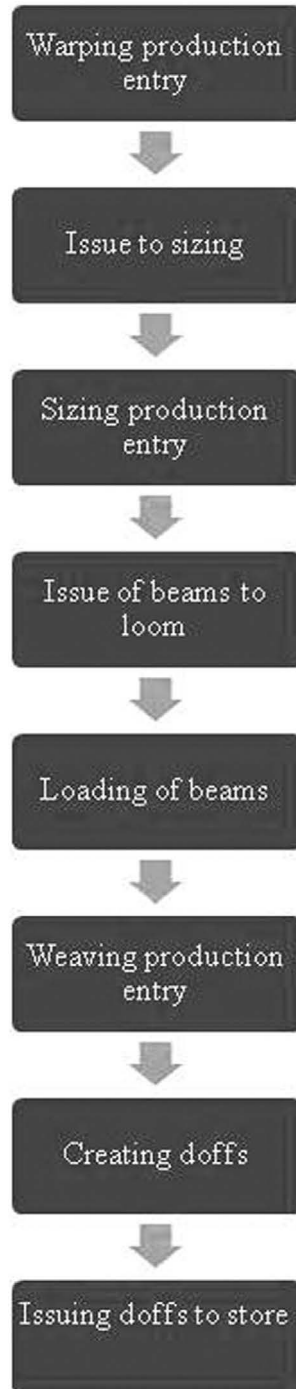


Figure 4.14 Weaving production flow in ERP

- **Sizing production entry**

The sizing production is entered against the material issued in the production entry screen by selecting the beam number of warping and sizing beam number. Beam numbers are taken from the beam master. If warping production is not reported and beam has been issued, then that particular beam will not be available in the drop-down to enter sizing production. Sizing materials are entered in the production lot and quantity is calculated based on the lot quantity. Before sizing production starts, material is requested from stores and an issue note is prepared using the “issue note” page. The sizing production and quantity of size material used are entered in the production entry screen under different tabs. Once production is entered, beams are issued for loading.

- **Issue of beams to loom and loading of beams**

The sized beams are issued to loom section using “issue beams” page and loading of beams takes place. The beams in weaving machine will either run out completely, or if the order quantity is achieved, ‘cut-off’ and kept for future usage if required. To report production in weaving, new beams are loaded as shown in [Figure 4.15](#) and old beams need to be unloaded to ensure that production is entered for the correct beam number and lot as well as to find out the length of sized warp available. For this, the “loom loading” page in ERP is used. In this page, loom number is selected for the lot and then the beam number that is loaded onto the loom is displayed. In the status drop-down, it will appear as “beam run out” and “cut-off.” Any one of the two is selected based on actual beam availability and the length of warp available will automatically populate the screen based on the weaving production and sized beam length. This can be altered and saved. [Figure 4.15](#) doesn’t show the beam unloading process described above but shows the beam-loading process transaction once beam unloading is concluded. After unloading the beam, new beams are loaded by selecting the same loom number. The new beam number of the sized beam to be used for production is selected and saved as shown in [Figure 4.15](#). Also the time of loading is entered and saved. Now production can be reported for the lot in weaving. In the meantime, the weaving team requests for weft yarn from stores using store indent and stores creates issue note to issue material for production. Similarly, empty weavers beam is loaded onto the loom using “weavers beam loading” screen.

MACHINE HEADER

Company: Fabyar Clothing Inc. ▼
 Business Unit: Unit 1 ▼
 Machine Group: MULTI-PHASE ▼

LOOM LISTING

Loom Code	Description	Production Order No	Production Lot No	Deliverable
LM101	LM 101	FYC-WPO-1516-89	FYC-WLOT-1516-134	TW2/2-80_20-180-52IN
LM102	LM 102	FYC-WPO-1516-89	FYC-WLOT-1516-134	TW2/2-80_20-180-52IN

LOADING DATA

Looming Method*: Knitting ▼
 Looming Duration*: 1.5
 Loading Date*: 10-Sep-2015
 Shift: A ▼
 Lateral Pieces: 1

BEAM DATA

Beam Placement	Beam No.
TOP ▼	WWB101 ▼
BOTTOM ▼	WWB212 ▼

Add Row

Submit Cancel Close

Source: Sylamb ERP by Fabyar Computing

Figure 4.15 Loom loading

- **Weaving production entry**

Weaving production can be entered lot-wise by selecting the lot number in the weaving production entry screen. Details such as date, shift time, employee name, and corresponding beam number and loom number will auto-populate the screen based on the lot number. The loom number and beam number come from the machine master, which is shown in Figure 4.16. Production is entered against the loom number and saved. All the looms for the particular lot will be displayed. There can also be another page provided where bulk loom production entry can be done as shown in Figure 4.17. All the loom numbers and their corresponding beam numbers, irrespective of the lot number, will appear on the screen, and the production can be entered at one go for all the looms entered and saved. In both pages, a “stoppage” tab will be provided to enter “stoppage” details. Production is entered till the required quantity is achieved. Once the final cloth beam is ready, doffing is done. A monthly production report sample is shown in Figure 4.18. It gives details about shift-wise production for all days with efficiency and idle-loom details. Various other details can be obtained in the report by changing the report configuration.

Machines

Machine Code: LM114
 Machine Name: LM-114
 Machine Group*: LOOM ▼
 Is Active:

Serial No: 10089
 Machine Cost: 32,75,000
 Location BU*: Unit 1 ▼

Make: SULZER
 Year: 2005
 Model*: M8300 MULTI-PHASE

Machine Attributes Process Parameters Production Parameters

Submit Cancel Close

Source: Sylamb ERP by Fabyar Computing

Figure 4.16 Machines master

Loom Production

REPORT DETAILS
 Company: Fabayar Clothing Inc.
 Business Unit: Unit 1
 Report No:
 Reported By:

REPORT DETAILS
 Report Date: 05-Oct-2015
 Shift: A
 Start Time: 09:00 AM
 End Time: 10:00 AM

LOOM WISE PRODUCTION DATA

Loom No.	Loaded Beams	Production Lot	EPI / PPI	Loom Picks	Loom RPM	Operator	Produced Length (MTR)	Produced Weight (KGS)	Breakages
LM101	WVB101,WVB212	FYC-WLOT-1516-134	89/20	13650	320	Selvan	87	35.7	Breakage
LM102	WVB221,WVB252	FYC-WLOT-1516-134	89/20	23870	308	Sandar	156	68.35	Breakage

Buttons: Add Row, Submit, Cancel, Close

Source: Sylomb ERP by Fabayar Computing

Figure 4.17 Loom production entry

Monthly Loom Production Report
ABC Textile Limited

Name Of Month: November-2012
Type Of Looms: All Looms

Date	Avg RPM	Avg Picks	Idle loom			Running Loom			Calculated Production			Actual Production			Average Efficiency			Total Idle Loom	Total Running	Total Calculated	Total Actual Prod.	Total Avg Eff	Remark
			A	B	C	A	B	C	A	B	C	A	B	C	A	B	C						
01-Nov-2012	350	52	0	1	0	45	44	45	4800	4800	4800	4563	4765	4568	88	84	86	1	134	14400	13896	86	
02-Nov-2012	350	52	0	0	0	45	45	45	4800	4800	4800	4578	4678	4657	94	88	92	0	135	14400	13913	91.33	
03-Nov-2012	345	47	0	1	0	45	44	45	4700	4700	4700	4675	4688	4702	96	86	88	1	134	14100	14065	89.33	
04-Nov-2012	355	46	0	1	0	45	44	45	4800	4800	4800	4876	4855	4867	85	90	84	1	134	14400	14598	86.33	Sunday
05-Nov-2012	360	47	0	0	0	45	45	45	4800	4800	4800	4765	4763	4765	88	92	85	0	135	14400	14293	88.33	
06-Nov-2012	354	47	0	0	0	45	45	45	4900	4900	4900	4867	4786	4675	87	85	84	0	135	14700	14328	85.33	
07-Nov-2012	350	47	0	0	0	45	45	45	4500	4500	4500	4523	4512	4521	92	88	86	0	135	13500	13556	88.67	
08-Nov-2012	345	45	0	1	1	45	44	44	4500	4500	4500	4564	4533	4568	87	92	88	1	134	13500	13665	89	
09-Nov-2012	345	45	0	1	1	45	44	44	4500	4500	4500	4534	4512	4555	89	89	87	1	134	13500	13601	88.33	
10-Nov-2012	355	45	0	1	1	45	44	44	4500	4500	4500	4439	4412	4401	88	88	89	1	134	13500	13252	88.33	

Figure 4.18 Monthly loom production report

• **Creating doffs**

The doff generation page is used to create doff generation slips. A lot number is selected and “generate doff” button is clicked. Based on the produced quantity, doff numbers are generated and printed onto the stickers. These numbers are generated based on the logic that is created during implementation. The doff number can have loom number, order number, and doff number based on company’s requirement for easy tracking. In the beam, once doffing is done, stickers are stuck onto each roll.

• **Issue doffs to store**

In the “issue doff to inspection” screen, doff numbers generated for each lot are shown. These numbers are selected and the material is issued to stores or to the inspection department directly depending on the company practice. If issued to store, inspection department requests material for inspection. If directly issued to inspection, inspection is carried out and material is taken for packing. Starting from this stage, each doff number is referred to piece number and the material is known by piece number.

4.3.2.4 Inspection and packing

The inspection and packing flow in weaving ERP is shown in Figure 4.19.



Figure 4.19 Inspection and packing flow in weaving ERP

- **Inspection**

The doffed pieces are taken for inspection and an inspection number is created in the ERP inspection page. Against inspection number, inspection details such as piece number, number of defects associated with doffs, type of defects, and so on are entered and saved. Based on the defects details entered, system will identify pieces that can be sent for packing and those to be rejected based on pre-fed selection details. In some cases, this is manually done. In the inspection page, pieces can be split into any numbers based on the defects. If there are defects, then that part is created as a separate piece number and is removed after entering the piece length. Once inspection is done, details are submitted for the concerned manager's approval. Once approved by the manager, defective pieces are sent to rejection store using "issue to store" screen and selecting "issue type" as rejection. The non-defective pieces are issued to packing using "issue to packing" page. The issue screen can be the same and the issue type, such as issue to packing, issue to rejection store, and issue to process, can be selected depending on the requirement.

- **Packing**

Non-defective pieces are packed into bales and bale numbers are generated using “bale packing” page. The bale weight as per packing is entered against the bale number and all other related details are entered and the packing details are saved. The material can then be issued to store to make it ready for dispatch. The packing report is obtained as shown in Figure 4.20. It consists of sort details, number of pieces, length, weight, and the inspected grade with remarks.

ABC Textile Limited								
DAILY PACKING REPORT : 2012-03-11 TO 2015-06-24								
Packed Date	Sort	Roll/Bale No	No Of Pieces	Length	Net Weight	Gross Weight	Grade	Remarks
12-Oct-2012	SORT2	AB/01	2	35	3	3.4	A	
12-Oct-2012	SORT2	AB/02	1	15	3	3.4	A	
12-Nov-2012	SORT55	AB/03	1	1	40	40.4	B	
12-Dec-2012	SE12	AB/04	1	50	30	31.4	A	
12-Dec-2012	SE14	AB/05	1	50	30	31.4	B	
12-Dec-2012	AEES12	AB/06	1	50	20	21.4	A	
12-Dec-2013	GREY12	AB/07	1	19	44	46	A	
12-Dec-2014	GREY28	AB/08	1	22	4	4.4	A	
12-Dec-2014	SORT4	AB/09	2	100	22	22.4	A	
06-Dec-2014	M234	AB/10	7	28	11	11.2	A	

Figure 4.20 Packing report

- **Packing list creation**

Based on bales packed and using the “packing list creation” page, bales to be sent to customer are packed and the list of bales available under each packing list is also saved in this page. The packing list number generated is provided to dispatch department through workflow for dispatch advice creation.

4.3.2.5 *Related masters, transactions, and reports*

Weaving-specific masters, transactions, and reports are discussed as follows:

The masters include sort master, operation master, beam master, QC defects master, and so on. Transactions include beam loading, unloading, bulk loom production entry, issuing beams to store, and so on. Reports specific to weaving include reports for the following items and functions: loading and unloading, efficiency and utilization, beam fall, loom position, loom-shed efficiency, knotting and gaiting status, grey inspection, and loom planning.

4.3.3 Fabric processing industry

The flow in processing industry can be divided into two types: (i) fabric processing and (ii) yarn dyeing. Both can be managed using ERP and these are discussed in detail. The process flow starts from creating quotation and ends with dispatching the material to customer.

4.3.3.1 Sales flow

The sales flow using ERP in a weaving industry, starting from quotation creation to order creation, is explained. Flow of sales activities in fabric processing industry is similar to the weaving flow process in ERP, as shown in Figure 4.11. A quotation is created using the “quotation creation” page and lab dip details are entered in this page. The fabric code for dyeing is created using the fabric code master. Similarly, various shades are created in the shade master as shown in Figure 4.21. The quotation is sent with lab dip details and samples if any to sampling and costing department. The cost of dyeing is worked out using the costing page and the final quotation is sent to customer. Also if sampling is required, a sample order is created and executed, similar to creating a regular customer order. All the processes related to creating a sample order will be similar to those of a normal order processing, and the only difference between the two is that in the normal order material is to be sourced for bulk production, but material already available in stock may be used to execute the sample order. Once an order is confirmed by the buyer, a buyer order is released and sales order is created based on the buyer order with all related details similar to those in sales order creation for the weaving process. The sales order has complete details about pricing, delivery date, quantity of material, shades required, and all other details. Once sales order is created, it is sent to planning department for proceed with the execution of order.

Shade Master	
SHADE DETAILS	
Shade No.	SH-145
Lab Dip No.	LD-1035
Colour	Golden Green
Customer	Walmart USA
ACHIEVABLE RECIPES	
Recipe Code	Description
RP-1002	RP-1002 VAT 3045
RP-1002	RP-1002 VAT 3045
<input type="button" value="Submit"/>	

Source: Sylamb ERP by Fabyar Computing

Figure 4.21 Shade master

4.3.3.2 Pre-production flow

The pre-production flow is shown in Figure 4.22. The process starts with creating a job card and ends with issuing of fabric and chemicals for production.

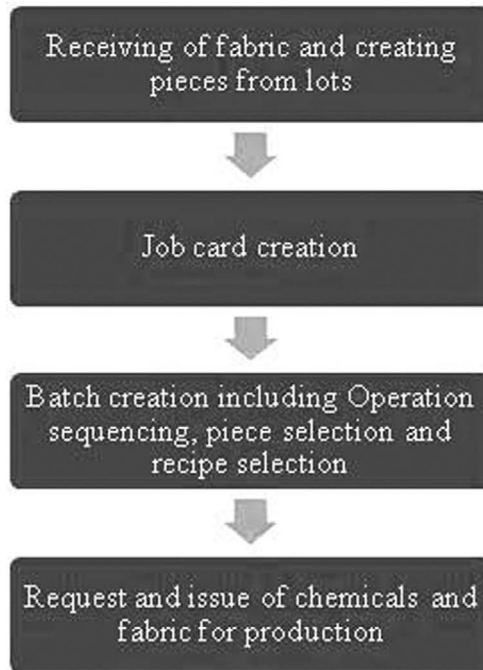


Figure 4.22 Fabric processing Pre production flow using ERP

- **Receiving of fabric and creating pieces from lots**

Normally in a processing industry, material to be dyed or printed is provided by the customer. Material is also sent along with the order. If not, material is procured by purchase department by releasing a PO based on sales order created. Once material is received in lot form, each lot is assigned a number and pieces are created from lots. Piece numbers are entered in the “material receipt” page of ERP and are updated in the stock for future use. These piece numbers are displayed during batch creation for selection. Only pieces updated in stock against a particular sales order are available for selection during batch creation.

- **Job card creation**

A job card is created based on the sales order created. It serves as production order in processing industry (see [Figure 4.23](#)). The “job card create” page in ERP is used for entering material details,

various processes to be carried out, quantity to be processed, date of processing based on delivery date, and the date planned by the planning department. A job card is created by production, and the total quantity of chemicals, operation sequencing, and processing parameters can be planned at the job card level or at the batch level. The operation sequencing can be done by selecting operations from the operation master and processing parameters will auto-populate from the process parameters master that can be changed by the user if needed. In industries, mostly operation sequencing and chemical requests are done at batch level; however ERP has options for both. If operation sequence and chemicals are calculated at the job card level based on the material quantity, it will auto-populate the screen during batch creation and the details can be modified if required at batch level. The job card once submitted generates a workflow to the concerned production user to create batches.

Job Card
APPROVED
RUNNING

CUSTOMER & CARD DETAILS

Job Card Number: FYC-PJC-1516-00178	Job Card Date: 01-Oct-2015	Customer: TRICO INTERNATIONAL
Business Center: HO	Production Cycle: Fresh	Shade No: SH-123
Colour: Turquoise Blue		

FABRIC LOT DETAILS

Fabric Lot No.	Quantity Received		No of Pieces
	Length (Meters)	Weight (Kgs)	
LOT/00145	2540	345.7	13
LOT/00148	1350	250.5	10

PROCESS DETAILS

S.No.	Process Name	Recipe Code	Liquor Volume	Completion Date
1	DESIZING	DZ-2034	3000	10-Feb-2013
2	BLEACHING	BL-3011	3000	12-Feb-2013
3	DYEING	DY-9034	3000	15-Feb-2013

Submit
Cancel
Close

Source: Sylamb ERP by Fabyar Computing

Figure 4.23 Job card creation

- **Batch creation**

The term “batch creation” is used exclusively in processing industry among all textile verticals as processing is normally done in batches. For one order, there can be any number of batches created based on order quantity, process requirement, and shade requirement. In the batch creation page, against job card number and sales order number, the pieces to be processed are selected one by one and saved. Batch creation page is shown in [Figure 4.24](#). Then in the process tab, the processes to be carried out are sequenced by selecting the processes

from process master or from the job card if available. The process parameters of each process can be checked and modified. The recipe for each process for various types of materials is entered in the recipe master. The requirement of chemicals for each shade is calculated based on the shade master specification. In the shade master, for each and every material, quantity for various shades is provided on the basis of weight, volume, or percentage. Once the process is selected, the recipe for each process is selected from the recipe master, and based on the quantity, the required chemicals are calculated and displayed. The user can modify it or if it is correct the same can be used. The batch can be created separately for “fresh” and for “reprocessing” materials. Once piece selection, operation sequence selection, process parameter selection, and required chemical calculation are carried out, the batch is submitted for approval through workflow to production manager.

Batch
PUBLISHED
MATERIAL RECEIVED
IN-PROGRESS

BATCH DETAILS

Batch No. <input type="text" value="FYC-BAT-1314-386"/>	Batch Date <input type="text" value="17-Sep-2015"/>	Production Unit <input type="text" value="FACTORY"/>
Job Card No. <input type="text" value="FYC-PJC-1516-245"/>	Customer <input type="text" value="TRICO"/>	Fabric Quality <input type="text" value="1x3 DERBY RIB"/>
Is TP Allowed? <input checked="" type="checkbox"/>	Production Cycle <input type="text" value="Fresh"/>	

LOT DETAILS

Fabric Lot No.	Received Quantity		Processed Quantity		Balance Quantity		No of Pieces
	Length (Meters)	Weight (Kgs)	Length (Meters)	Weight (Kgs)	Length (Meters)	Weight (Kgs)	
LOT/00145	2540	345.7	1000	120.5	1540	225.7	13
LOT/00148	1350	250.5	1350	250.5	1350	250.5	10

PROCESS & PIECES

S.No.	Process Name	Recipe Code	Liquor Volume	Completion Date
1	DESIZING	DZ-2034	3000	10-Feb-2013
2	BLEACHING	BL-3011	3000	12-Feb-2013
3	DYEING	DY-9034	3000	15-Feb-2013

Source: Syfam ERP by Fabiyar Computing

Figure 4.24 Batch creation

- **Request and issue of chemicals and fabric for production**

Once batch is approved, based on batch requirement, store indent is created using “store indent create” page and is printed and sent to fabric store and chemical store to get the material and chemicals for production. Workflow will also be generated to inform stores about the request for fabric and chemicals. Once request is received, stores issues the fabric to the first operation in the sequence mentioned in the batch and issues chemicals for all processes. There is an option in the ERP system to issue chemicals to all processes at one go.

4.3.3.3 *Production flow*

The production flow is shown in Figure 4.25. The process starts with entering production to sending the finished material to the finished fabric store.



Figure 4.25 Fabric processing production flow in ERP

- **Production entry**

Once material and chemicals are received and production begins, after completion of each process, production is entered against the process and material is sent to the next process. In the production entry page, when the batch number is selected, it will show the process name. The process name, machine number, and employee name are selected and the number of pieces processed is entered. The date and time are also entered. In the recipe page, quantity of chemicals used is entered and also the actual process parameters maintained are entered in the process parameters page.

- **Issuing to next process and subsequent production entry**

Once production is entered, material is issued to the next process, and subsequent entry of processed material details and chemicals used are entered for each process till the completion of all processes. At any given

point in time, based on the production details entered, it is possible to find out the work-in-process details (WIP). After each process, quality check is made to ensure that the fabric is processed properly.

- **Quality check during process**

The quality of processed material is checked after each process. If quality is not up to the mark or if the shade doesn't match and is identified to be different during the process, the process is repeated by creating a separate batch for piece numbers in which defect is noticed. A sub-piece-number like 1/1 is created for piece number 1 and a batch is created with the process type as "reprocessing." The batch is processed separately and production is entered separately. Once the final process is concluded, material is issued to stores and gets updated with other piece numbers of the same batch.

- **Issue finished material to store**

After conclusion of all production processes, finished material is issued to stores. The reprocessed material will also be issued to stores using "issue to store" page once reprocessing has been carried out successfully. Final inspection is done once material is issued to stores.

4.3.3.4 *Inspection and packing*

The inspection and packing process involves final inspection, roll packing, and packing slip creation as shown in Figure 4.26.



Figure 4.26 Fabric processing inspection and packing flow in ERP

- **Final inspection**

The pieces issued to stores are taken for inspection, and an inspection number is created in ERP inspection page. Against the inspection number, inspection details such as piece number, defects associated with piece number, type of defects, and so on are entered and saved. Based on the defects entered, system identifies pieces that can be sent for packing or pieces to be rejected based on pre-fed selection details. In some cases, this is manually done. In the inspection page, pieces can be split into any numbers based on defects. If there are defects, the defective part is identified with a separate piece number and removed after entering the piece length. Once inspection is done, details are submitted for manager's approval. Once approved by manager, defective pieces are sent for reprocessing by creating a new batch number, and the same process of processing a batch is followed to ensure that the defect is corrected. The non-defective pieces are issued to packing using "issue to packing" page. The issue screen can be the same and issue types like issue to packing and issue to reprocessing can be selected as per requirement.

- **Roll packing**

The non-defective pieces are wound and packed in roll form, and roll numbers are generated using the "roll packing page" in ERP. The roll weight as per packing is entered against roll number and all other related details are entered and packing details are saved. After this, material can be issued to finishing store to get it ready for dispatch.

- **Packing list creation**

Based on rolls packed, using the "packing list creation" page, rolls to be sent to the customer are packed and the list of rolls available under each packing list is saved in this page. The packing list number generated is provided to dispatch department through workflow for dispatch advice creation.

4.3.3.5 *Related masters, transactions, and reports*

The fabric processing-specific masters, transactions, and reports are provided as follows:

The masters are shade master, process cycle master, recipe master, process group master, and so on. Transactions include job card, batch creation, lab dip card, process QC, reprocessing entry, and so on. Reports specific to fabric processing are shade card, recipe report, recipe consumption report, pending batch report, job card status report, reprocessed batches report, reprocessed reasons report, and so on.

4.3.4 Yarn processing industry

The process flow in yarn processing industry is very similar to the fabric processing industry. The process flow in ERP is discussed here.

4.3.4.1 Sales flow

The sales flow using ERP in a yarn processing industry is similar to the fabric processing flow process in ERP. The quotation is created using the quotation creation page and lab dip details are entered in it. The yarn codes are created using yarn master that is shown in Figure 4.27. Greige yarn codes and final dyed yarn codes are created. Similarly various shades are created in the shade master. The quotation after creation is sent along with lab dip details and sample if any to sampling and costing department. Cost of dyeing is worked out using the costing page and quotation is sent to customer. Also if sampling is required, a sample order is created and executed similar to the processes carried out for executing a regular customer order. Once order is confirmed by the buyer, a buyer order is released and the yarn order is created based on the buyer order with all related details, which is similar to sales order creation in fabric processing and as shown in Figure 4.28. The yarn order has complete details about pricing, delivery terms, quantity of material, shades required, and all other details of the order. Once yarn order is created, it is sent to planning department for planning order execution.

Material (Yarn)

HEADER

Material Code** 4024_CMB_WHITE

Description** 40g COMBED WHITE

Parent Material Group** COMBEDYARN

Group Description

Is Active

UOM KGS

Remarks

DETAILS

Properties Processing Data

Property Code	Description	Value
COUNT_NE	Count (Ne)	40
TWIST	Twist Per Inch	24
SHADE_NO	Shade No.	ST109
COLOR	Color	WHITE
PLY	No of Piles	1
PILE_LENGTH	Pile Length	
GREIGE_YARN	Greige Yarn ?	Yes

Generate Material Code

Submit
Cancel
Close
Create New

Source: Sylamb ERP by Fabyar Computing

Figure 4.27 Yarn master

Sales Order - Yarn

ORDER HEADER	CUSTOMER DETAILS	TERMS
Company: Fabyar Clothing Inc.	Customer Code: []	Version No: 1
Business Unit: Unit 1	Customer Name: []	Order Currency: INR - Indian Rupee
Order No: []	Customer Address: []	Operational Currency: INR
Order Date: 05-Oct-2015	Customer PO No: []	Payment Term: PIA - Payment in Advance
Created by: admin	Customer PO Date: []	Delivery Term: FOB - Free On Board
Order Status: INITIAL		Remarks: []
Workflow Status: UNINITIALISED		

Deliverables		Taxes and Charges							
Yarn Code	Count	Shade	Quantity	UOM	Price	Amount	No of Package	Package Type	
								Cones	
								Bobbins	
								Hanks	

Buttons: Submit, Cancel, Close

Source: Syntex ERP by Fabyar Computing

Figure 4.28 Yarn dyeing order creation

4.3.4.2 Pre-production flow

The pre-production flow in yarn processing is shown in Figure 4.29. The process starts from calculating the material requirement to issuing material for production.



Figure 4.29 Yarn processing pre-production flow in ERP

- **Greige yarn requirement calculation**

Once yarn order is created, based on the quantity of dyed yarn required, greige yarn requirement is calculated, including percentage of wastage and shrinkage, using “generate material requirement” page. The greige yarn code is selected from the yarn master, and the required quantity is calculated by the ERP system. The quantity can be modified if required and submitted. Once submitted, yarn lot creation is done for operation sequencing and recipe selection.

- **Yarn lot creation**

The yarn lot is created using “create yarn lot” page as shown in Figure 4.30. In this page, yarn order number is selected using the order mapping tab and the quantity utilized for creating the lot is entered. Already created lots will appear for that particular order. Based on the requirement, a new lot can be created and its processes can be selected and submitted. The process sequence will auto-populate as it is constant for all the orders, which includes soft winding, dyeing consisting of scouring, bleaching, dyeing, and final winding. Recipe can be selected from recipe master for all the three chemical processes and calculation of chemical requirement can be made based on the shade percentage. Once submitted, in the next page, greige yarn codes and final dyed yarn codes get populated along with quantity and yarn requirement. Once these data are submitted, a lot is created based on production capacity. Once the lot is created, it is submitted for approval through ERP workflow.

Yarn Lot

BATCH DETAILS

Yarn Lot No. FAB-BAT-1314-00109 Lot Date 26-Jan-2013 Production Unit FACTORY

Customer Walmart USA Shade SH108 Color 1x3 DERBY RIB

Production Cycle Fresh

LOT DETAILS

Yarn Lot No.	Received Quantity		Processed Quantity		Balance Quantity		Package Type
	Weight (Kgs)	No of Packages	Weight (Kgs)	No of Packages	Weight (Kgs)	No of Packages	
5625A	2540	300	1000	90	1540	210	Cones
5625B	1350	400	0	0	1350	400	Hanks

PROCESS DETAILS

S.No.	Process Name	Recipe Code	Liquor Volume	Completion Date
1	SCOURING	SR-2034	3000	16-Feb-2013
2	HALF-BLEACH	BL-3011	3000	12-Feb-2013
3	DYEING	DY-9034	3000	15-Feb-2013

ORDER MAPPING

Yarn Order No.	Order Qty	Included Qty	Completion Date
⊕ FYC-Y50-1516-89	2500	1300	28-Sep-2015

SUBMIT

Source: Sybase ERP by Infosys Computing

Figure 4.30 Yarn dyeing lot creation

- **Request and issue of chemicals and yarn for production**

Once the yarn lot is approved, based on batch requirement, store indent is created using “store indent create” page and is printed and sent to

yarn store and chemical store to get the material and chemicals for production. The workflow will also be generated to inform stores about request for yarn and chemicals. Once request is received, stores issues yarn to soft winding and issues chemicals for all processes. There is an option in the ERP system to issue chemicals to all processes at one go.

4.3.4.3 Production flow

The production flow that is shown in [Figure 4.25](#) for fabric processing production flow can be referred as the process remains the same. The process starts with entering production and concludes with sending the dyed yarn to the dyed yarn store.

- **Production entry**

Once the material and chemicals are received and production has begun, production is entered against the lot for soft-winding process. The production entry page is shown in [Figure 4.31](#), where the lot number is selected and production is entered against that lot number. The machine code and operator name is selected and production quantity is entered. The date and time are also entered along with stoppage details. In the operation tab, the operation for which the production is entered is selected. In this case, it is soft winding. In some ERP software, the lot number when selected will show the operation or process for which production needs to be entered and there is no separate operation tab required. The operation or process refers to soft winding, dyeing, bleaching, and so on. After entering the production, material is issued to scouring and scouring production is entered. In the recipe page, quantity of chemicals used is entered and also the actual process parameters maintained are entered in the process parameters page.

Yarn Production

REPORT DETAILS

Company: Fabyar Clothing Inc. (dropdown)
 Business Unit: Unit 1 (dropdown)
 Report No:
 Reported By:

SHIFT DETAILS

Report Date: 28-Sep-2015
 Shift: A (dropdown)
 Start Time: 9:00 AM
 End Time:

MACHINE DETAILS

Machine Code: JTD101
 Production Cycle: Fresh (dropdown)
 Operator: Selvan
 Remarks:

Production | Operations | Stoppages

Yarn Lot No.	Yarn Material Code	Resultant Count	Produced Weight (KGS)	No of Packages	Weight Per Package	Remarks
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Add Row

Submit Cancel Close

Source: Sylobm ERP by Fabyar Computing

Figure 4.31 Yarn production entry page

- **Issuing to next process and subsequent production entry**

Once production is entered for scouring, material is issued to next process of bleaching and subsequent entry of processed material details and chemicals used are entered for bleaching and dyeing. After each process, quality check is made to ensure that fabric has been processed properly.

- **Quality check during process**

The quality of processed yarn is checked after each process (viz., scouring, bleaching, and dyeing). If quality is not up to the mark or if the shade doesn't match and is identified during the process, the process is carried out again by creating a separate lot for the soft-wound packages in which defect is noticed. The lot is created with the process type as "reprocessing." The lot will be processed separately and production will be entered separately. Once the final process of final winding is done, material is issued to stores and gets updated with other packages of the same batch.

- **Issue finished material to store**

After concluding the final winding, finished material is issued to stores. The reprocessed material is also issued to stores using "issue to store" page after reprocessing is carried out successfully. The final inspection is made once material is issued to stores.

4.3.4.4 *Inspection and packing*

The inspection and packing is similar to the fabric processing inspection and packing flow. The inspection is done using create inspection page and once inspection is carried out, yarns are packed in cartons, and these details are entered in "carton packing" page. Based on cartons created, packing list is created and material is ready for dispatch. Details are sent through workflow for creation of dispatch advice.

4.3.4.5 *Related masters, transactions, and reports*

The yarn processing-specific masters, transactions, and reports are discussed as follows:

The masters are shade master, operations master, recipe master, and so on. Transactions include yarn order, yarn lot creation, lab dip card, reprocessing entry, and so on. Reports specific to yarn processing are shade card, pending lot creation, lot status report, reprocessed lot report, reprocessed reasons report, WIP report of yarn lots, and so on.

4.3.5 Knitting industry

The knitting process is a very simple process in the entire textile supply chain compared to processing or garmenting, as it involves very few activities unlike manufacturing. The processes starting from quotation creation to packing list creation are detailed. The sequence is explained in detail in the following:

4.3.5.1 Sales flow

The sales flow of knitting department is very similar to the sales flow of weaving department that is shown in [Figure 4.11](#).

- **Create quotation**

The request for quotation (RFQ) comes from the customer and customer informs whether he requires a quick quotation or detailed quotation. The quotation creation is done using the quotation creation page in ERP. Similar to the “SORT” created in weaving, sorts are created for knitting by entering all the related details of the fabric to be produced. The material (fabrics) master (sort) of knitting is shown in [Figure 4.32](#), and it has all the fabric details and particulars like CPI, WPI, loop length, GSM, and so on. After creating these in the quotation transaction page, the sort is selected and the quantity of material required is entered, and the quotation is sent via workflow to initiate sample analysis. Mostly customer might send a sample or would give specifications of the fabric required, such as yarn count, knit type, loop length, GSM, WPI, and CPI. During quotation creation, “quick” or “detailed” option is selected; if the option “quick” is chosen there is no need for sampling. If the option “detailed” is selected and submitted, a workflow is generated for the sampling team and an automatic sample order is created with specifications given in the quotation.

Material (Fabrics)

HEADER

Material Code** SJ005040_180_24_WHITE_1!

Description** SINGLE JERSEY 50*40 / 180 GSM / WHITE

Parent Material Group** KNITTEDFAB

Group Description

Is Active

UOM MTR

Remarks

DETAILS

Properties Composition Data Design Data

Property Code	Description	Value
CPI	Course Per Inch	50
WPI	Wales Per Inch	40
GSM	Grams Per Sq.Meter	180
GAUGE	Machine Guage	24
COLOR	Color	WHITE
LOOP_LENGTH_MM	Loop Length (MM)	1.5
WIDTH	Width (in)	30

Generate Material Code

Submit Cancel Close Create New

Source: Sytamb ERP by Fabyar Computing

Figure 4.32 Knit fabric (sort) master

- **Sample analysis and Sample creation**

Similar to the process in weaving department, yarn codes are created and BOM is generated. The weight of yarn required based on the order quantity is calculated and displayed along with wastage percentage. The formula for calculation is programmed in the ERP system; hence, the job of sampling team is simplified. If it is a detailed quotation, based on sample order, sample production is carried out and material is shipped. All activities followed for a regular order are followed for a sample order where material is sourced and product is manufactured and shipped with all details entered in appropriate screens in ERP. Once sample is made (detailed quote) or materials list is generated (quick quote), the quotation is sent to costing department as a workflow for costing of fabric. Sample order number is referenced in quotation for future reference. The type of knit, whether flat or circular, is selected to base the costing on the type of knit selected.

- **Costing of fabric**

Costing of fabric is carried out in a manner similar to weaving costing and provision is available to auto-populate the costs of a previous similar order for reference and the details can be altered. User can alter costs or enter costs and arrive at the final cost of fabric. Costing is submitted and through workflow it reaches the concerned manager for approval. Once manager approves the cost and submits, a workflow is generated to sales department personnel to verify all the details in the quotation and also pricing. After verification, quotation can be sent to customer with or without sample as per requirement.

- **Creating sales order**

Once quotation is approved by buyer and an order is received, a sales order is created based on buyer's PO with all necessary details related to fabric specifications, delivery date, packing details, and so on and submitted. Delivery details are entered in the delivery tab, including the port of shipment for export. The process is very similar to the flow process in weaving. After creation of sales order, it is sent for approval through workflow to sales manager. Once approved, it goes to planning department for production order creation.

4.3.5.2 *Pre-production flow*

Figure 4.33 shows pre-production flow in knitting ERP, starting from creating production order to issuing yarn for knitting. In knitting industry, sometimes fabric is woven in “made to stock” category. In that case, a production order can be directly created without a sales order, and later when the material

is sold, a sales order can be created and material produced can be assigned to sales order and dispatched. During production order creation, the option “made to stock” can be chosen; once this option is chosen, system will not ask for a sales order number to be associated to the production order.

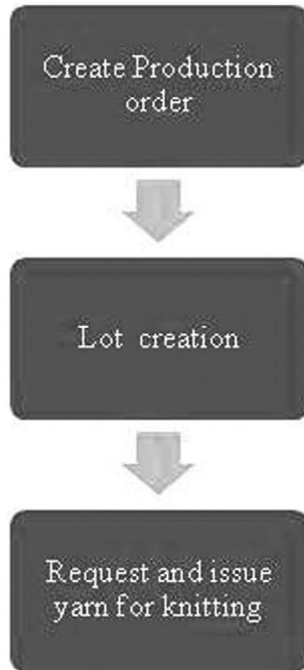


Figure 4.33 Pre-production flow in knitting ERP

- **Create production order**

Production order is created based on sales order with all details related to the customer order number, such as sales order number, process, operation to be carried out, production date, and quantity or whether it can be made to stock also. It is shown in [Figure 4.34](#). The process and operation can be entered when “continue” button is pressed. The start date and end date of production are added to the order. Similar to weaving, if quotation was not created, then after production order creation, planning department defines fabric specification and generates BOM. If quotation was created, BOM information and fabric specification can be obtained from quotation. The production order creation can be done separately for flat knit and circular knit. One sales order might have different material requirements, and so, different production orders can be created based on the product required. Once production order is created, it is sent for approval; after approval, change slips are created.

Production Order - Knitting

HEADER DETAILS

Company: Fabyar Clothing Inc. (dropdown)
 Business Unit: Unit 1 (dropdown)
 Order No.:
 Order Date: 05-Oct-2015
 Document Status: INITIAL
 Workflow Status: UNINITIALISED
 Created By: admin

ORDER DELIVERY

Order Type: CIRCULAR KNIT (dropdown)
 Production For: ORDER (dropdown)
 Sales Order No.:
 Ex-Factory Date:
 First Delivery Date:
 Days to Complete:

ORDER DETAILS

Sales Order No.	Material Code	Description	Quantity	UOM	Remarks

Add Row

Submit Cancel Continue Close

Source: Sytamb ERP by Fabyar Computing

Figure 4.34 Production order creation

- **Lot creation**

Lot creation is commonly known as “change slip generation” in knitting companies. It is the process of splitting the production order into lots and assigning those lots to a particular knitting machine with yarn requirement details to enable production. Once change slip is generated and given to a worker, he starts the process of requesting yarn for commencing the knitting process based on the start date after completing the existing production of a different lot. The change slip consists of order details, machine to be used for knitting, and yarn requirement for knitting; all these details will populate automatically based on the production order created. The yarn requirement will also be based on the number of days it will take to execute part of the order in a particular machine. The start and end date of production is also considered to calculate the yarn requirement of a particular knitting machine or a group of machines that are part of the lot that is created. Once change slip is generated, it is sent for the approval of production manager. Based on his approval, production team requests yarn for knitting and specifies the requirement date using the store indent page.

- **Request and issue yarn for knitting**

On submission of store indent, a workflow is generated for production manager to approve and then it reaches stores. Stores team issues material by creating an issue note against store indent. The issue is added to the “knitting” process on the issue page. Before requesting for material, production department user views stock availability in stores for the particular yarn. The yarn would have been procured based on the sales order created when planning department raised the PR or the yarn would have been in stock. It is essential that production user verifies stock using stock availability page at an early stage to avoid yarn shortage for knitting. Once yarn is received, production operation starts.

4.3.5.3 Production flow

Figure 4.35 shows production flow in knitting using ERP, starting from knitting production entry to issuing doffs to store.

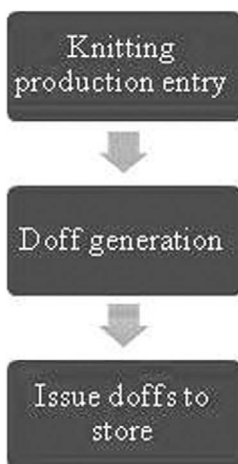


Figure 4.35 Knitting production flow in ERP

- **Knitting production entry**

After receiving yarn from stores, production starts. Daily production is entered in the production entry screen by selecting the lot number, or as shown in Figure 4.36, machine is selected and production is entered. In many ERPs, based on the lot number, it will populate the machine. The shift is selected and production details are entered along with employee name selected from the drop-down. The stoppage reasons are entered and submitted in the stoppage entry page.

Knitting Production

REPORT DETAILS				SHIFT DETAILS			
Company	Fabyar Clothing Inc.	Report Date	28-Sep-2015	Shift	A	Start Time	9:00 AM
Business Unit	Unit 1	Report No		End Time			
Reported By							

Machine Code	Machine Type	Produced Material Code	Width / DIA	Operator	Produced Weight (KGS)	Produced length (MTR)	No of Pieces / Rolls	Remarks
CK08	CIRCULAR KNIT	SJ003_40/30_56IN_WHIT	56	Selvan	30	78.5	2	
FB18	FLAT BED							

Buttons: Submit, Cancel, Close

Source: Sylamb ERP by Fabyar Computing

Figure 4.36 Knitting Production entry

- **Doff generation**

The doff generation page is used to create doff generation slips. The lot number is selected and “generate doff” button is clicked. Based on the produced quantity, doff numbers are generated and printed onto the stickers. These numbers are generated based on the logic that is created during implementation. A doff number can have knitting machine number, order number, lot number, and doff number based on company’s requirement for easy tracking. Once doffing is done, these stickers are stuck onto each roll.

- **Issue doffs to store**

In the “issue doff to inspection” screen, doff numbers generated for each lot are shown. Doff numbers are selected and material is issued to stores or to inspection department directly based on company practice, which is similar to what happens in the weaving process. If material is issued to store, inspection department requests material for inspection. If material is directly issued to inspection, inspection is carried out and material is taken for packing. Starting from this stage, each doff number is referred to as piece number and material is known by piece number, which is similar to weaving operation.

4.3.5.4 *Inspection and packing*

The inspection and packing process is done exactly the same way of how weaving process is carried out in ERP as shown in [Figure 4.19](#). Inspection is done and details of defects if any are saved. Once inspection is done, details are submitted for manager’s approval. Once approved by the manager, defective pieces are sent to rejection stores using “issue to store” screen and selecting issue type as rejection. Non-defective pieces are issued to packing using the “issue to packing” page. The bale packing is carried out and finally packing list is created similar to the one that is created in the weaving process flow in ERP.

4.3.5.5 *Related masters, transactions, and reports*

The knitting-specific masters, transactions, and reports are discussed as follows:

The masters are knit sort master, knit type master, operations master, and so on. Transactions include knit order, knit lot or change slip creation, knitting production entry, bulk production entry, and so on. Reports specific to knitting are change slip report, pending change slip creation, lot status report, WIP report, knit production status report, and so on.

4.3.6 Garment industry

The garment flow process in ERP is quite significant because of the planning and scheduling process. The sewing process requires more planning and scheduling for efficient functioning, and ERP helps in achieving the efficiency. The processes starting from quotation creation to garment packing are detailed. The sequence is explained in detail in the following.

4.3.6.1 Sales flow

The sales flow for an apparel company is similar to the sales flow of a weaving department as shown in [Figure 4.11](#). However, it involves many details specific to its processes.

- **Create quotation**

The buyer requests for a quotation and a quotation is created using ERP quotation creation page. Before creating quotation, style is created in the style master as shown in [Figure 4.37](#). It will have details related to mapped part groups, customer, style code, description, and a picture of the style. Once a style is created, it is selected in quotation and the number of pieces required is entered. All other required details are entered (like whether quotation requires a sample or not) and submitted. Once submitted, quotation reaches the sampling department for sample analysis.

Source: Sylamb ERP by Fabyar Computing

Figure 4.37 Style master

- **Sample analysis**

If sample is required, then a sample order gets generated automatically based on the quotation created. If not, to analyze the sample provided, a workflow action item will be generated for the sampling department to calculate the requirement of fabric and trims. Planning department may also carry out the activity of generating material requirements. Once a sample order or a workflow is received, sampling activity is carried out. A BOM is generated based on garment specifications. The fabric required is selected from the fabric master and trims and accessories from trims and accessories master and requirement is calculated. Fabric quantity and trims and accessories required are calculated automatically along with wastage and displayed. Before calculating fabric quantity, pattern in-charge will do marker planning or else marker efficiency is kept as constant based on the style category and is required for calculating fabric weight. Marker planning can be done using ERP using marker preparation page and laying details can be obtained as report. Once requirement list is generated, sampling is carried out similar to how it is done for a normal order. If sampling is not required, sampling page is filled and submitted for generating a workflow for costing department to do costing.

- **Costing of fabric**

The costing page of the quotation is opened by the concerned personnel and cost details of fabric, packing material, CMT cost, overheads cost, and all other costs are entered. The user can enter costs and arrive at the final cost of fabric. Costing is submitted, and through workflow, it reaches the concerned manager for approval; once manager approves cost and submits, a workflow is generated for the sales department personnel to verify all details in the quotation and also pricing. The sales head can make alterations to pricing if required and the final quotation can be printed from the ERP system and sent to the customer; if sample is required, then sample is made and sent to customer.

- **Creating sales order**

Once quotation is approved by the buyer and an order is received, a sales order is created based on the buyer PO with all necessary details related to garment specifications, size requirement, delivery date, packing details, and so on and submitted. If the buyer has requested for a set of garments like top and skirt or pant and shirt, then set details are entered in the order. Delivery details are entered in the delivery tab, including the port of shipment for export. After the creation of sales order, it is sent for approval through workflow to sales manager. Once approved, it goes to planning department for production order creation

and for planning and scheduling. The merchandiser normally orders the accessories once a sales order is created. The merchandiser places the PO for trims and accessories based on the materials requirement using “create accessories PO” page in ERP.

4.3.6.2 *Pre-production flow*

Figure 4.38 shows pre-production flow in garment ERP, starting from creating production order to issue of fabric for cutting.



Figure 4.38 Pre-production flow in garment ERP

- **Create production order**

Production order is created based on sales order with all details related to customer order number, sales order number, production date, and quantity. The start date and end date of production will be added to the order. If quotation was not created, after production order creation, planning department defines fabric specification and generates BOM. If quotation was created, BOM information and fabric specification can be obtained from quotation. Once production order is created, it is sent for approval and after approval it is sent for planning and scheduling

• **Planning/scheduling**

Once production order is created, planning department and industrial engineering (IE) department perform scheduling and line-balancing work, respectively. The operation master in ERP has a list of operations to be carried out in relation to stitching, such as serging, attaching cuff, attaching pocket, and so on. For each of these operations, the standard allowed minutes (SAM) value is measured by IE department and entered in the operation master along with degree of difficulty. Against every style, operation bulletin is prepared using the operation bulletin page, which is shown in Figure 4.39. Once the operation or sewing step is selected, it will populate the SAM value at different efficiency percentage with production details. It will also have details of machines required, workers required, and efficiency and target to be achieved. For each style, an operation bulletin is created. The operation bulletin report is shown in Figure 4.40 for better understanding.

Figure 4.39 Operation bulletin

Figure 4.40 shows the operation bulletin report giving details of individual operation for each section and sub-section for each style with pieces requirement and total thread consumption. It will also give machine requirement details along with SAM and target output. Once the bulletin is prepared, it is linked with the production order for the specific style if there are many styles of garment in that order. Planning department manually or automatically plans the order using the “create plan” page, and based on it, production plan is created for the particular style required.

Sewing										
Section: BAND		Sub Section: BAND CURVE				OPERATION BULLETIN FOR STYLE NUMBER XX8XX				
Seq No.	Operation	SAM	Target Output	Machine Type	Attachment / Work Aid	No. of Machines	Seam Length/Thread Cons. in CM.	Factor	Frequency	Total Thread Consumption
1	BAND HEMMING	0.71:	84:	SNLS		1:	1.0000:	2.50:	1:	2.5000
2	MARK BAND	0.52:	113:	TBL STANDING		1:	0.0000:	0.00:	1:	0.0000
3	BAND MAKING	0.60:	100:	SNLS		1:	1.0000:	2.50:	1:	2.5000
4	MARGIN SIZING AND TURNING	0.48:	125:	TBL STANDING		1:	0.0000:	0.00:	1:	0.0000
5	BAND TOP STITCH	0.63:	95:	SNLS		1:	1.0000:	2.50:	1:	2.5000
Section: CUFF										
Sub Section: CUF										
Seq No.	Operation	SAM	Target Output	Machine Type	Attachment / Work Aid	No. of Machines	Seam Length/Thread Cons. in CM.	Factor	Frequency	Total Thread Consumption
6	CUFF HEMMING	0.57:	105:	SNLS		1:	32.0000:	2.50:	2:	160.0000
7	CUFF MARKING	0.46:	130:	MARK TBL STANDING		1:	0.0000:	0.00:	2:	0.0000
8	CUFF MAKING	0.92:	65:	SNLS		1:	45.0000:	2.50:	2:	225.0000
9	CUFF TURNING	0.61:	98:	TBL STANDING		1:	0.0000:	0.00:	2:	0.0000
Section: SLEEVE PLACKET										
Sub Section: SLEEVE PLACKET BIG										

Figure 4.40 Operation bulletin report

• Request and issue fabric for cutting

After planning, line balancing, and scheduling, production requests for fabric by creating a store indent. In the store indent page, fabric code and description are selected and the required quantity gets populated automatically based on the production order. It can be changed if required, and the store indent is submitted. On submission, a workflow is generated for production manager to approve and then it reaches stores. The stores team issues material by creating an issue note against the store indent. The issue is done to the process “cutting” on the issue page. Once material is received, production starts.

4.3.6.3 Production flow

Figure 4.41 shows production flow in garmenting using ERP, starting from cutting production entry to issuing garments for inspection.

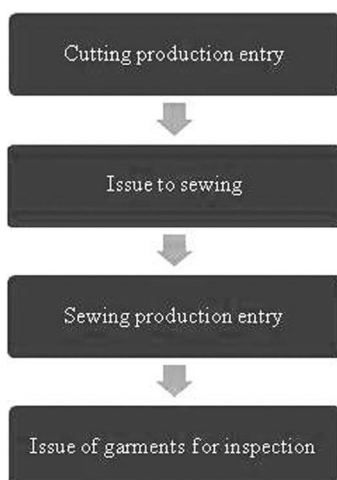


Figure 4.41 Garment production flow in ERP

• **Cutting production entry**

The received fabric is laid and cut and bundled into pieces. The laying details can be obtained from ERP and are shown in Figure 4.42 as cutting report bunches. It gives details about garment part, marker reference number, number of panels, plies and pieces per ply, size ratio, and fabric roll details. The laying can be done based on these details. After laying and cutting, the bundle numbers that are generated and printed using ERP are used to tag the bundles. Bundle generation transactions are shown in Figure 4.43. The cutting production is reported based on the number of pieces cut in the “report production” screen as shown in Figure 4.44. Production is entered based on the ratio for each size. Figure 4.44 shows that for size 32, the size ratio is 10. So it will not allow production to be reported to any value higher than 10. Once the required cutting production is achieved, it indicates that the required number of bundles are ready for sewing. Once production is reported, material is issued to sewing through “issue to sewing” page in ERP.

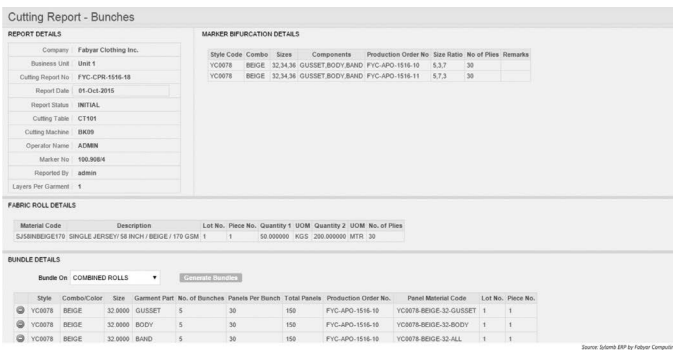


Figure 4.42 Cutting report bunches

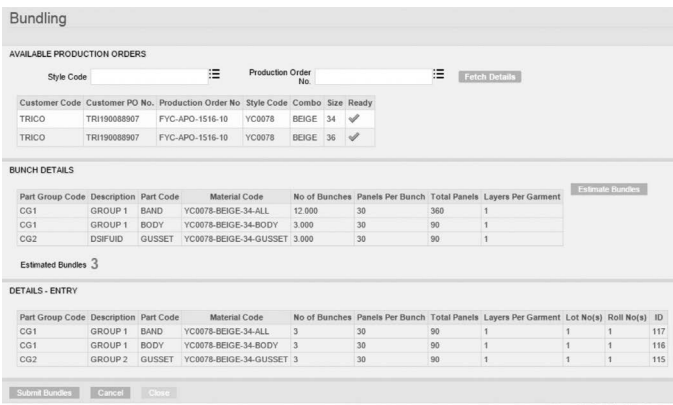


Figure 4.43 Bundle generation

Cutting Report

REPORT DETAILS

Company: Fabyar Clothing Inc.
 Business Unit: Unit 1
 Cutting Report No: FYC-CPR-1516-18
 Report Date: 01-Oct-2015
 Report Status: INITIAL
 Cutting Table: CT101
 Cutting Machine: BK09
 Operator Name: ADMIN
 Marker No: 100.0004
 Reported By: admin
 Layers Per Garment: 1

MARKER DETAILS

Production Order No	Style Code	Garment Code	Components	No of Piles	Combo	Sizes	Size Ratio	Remarks
YC0078	YC0078	GUSSET_BODY_BAND	30	BEIGE	32,34,36	10:10:10	NO	

ORDER BIFURCATION

Production Order No.	Ratio String	32	34	36
FYC-APO-1516-10	5,3,7	5	3	7
FYC-APO-1516-11	5,7,3	5	7	3
		10.0000	10.0000	10.0000

MARKER BIFURCATION VIEW

Production Order No.	Size Ratio
FYC-APO-1516-10	5,3,7
FYC-APO-1516-11	5,7,3

Buttons: Submit, Cancel, Close, Batch Generation, Issue Details

Source: Synteb ERP by Fabyar Computing

Figure 4.44 Cutting production reporting

- **Issue to sewing**

Bundles are selected and issued to sewing process. If there is any additional embroidery or printing process, then the bundles are issued to embroidery or printing operation. If material is to be sent out for embroidery or printing it is issued to stores. Separate POs are made in ERP and material is sent outside for embroidery or printing process.

- **Sewing production entry**

Sewing production is entered against the issued material in the production entry screen by selecting the order number, date, and shift time. The reported time is also captured for future usage. Once production is entered, garments are issued for inspection.

- **Issue of garments for inspection**

In the “issue garments to inspection” screen, number of garments sewn against each order number is shown. It is then submitted for issue to inspection. Inspection team gets a workflow to carry out the inspection of garments produced.

4.3.6.4 *Inspection and packing*

The inspection and packing process involves final inspection, garment packing, and packing slip creation as shown in Figure 4.45.

- **Inspection**

The garments issued for inspection are inspected, and details of inspection are entered in the ERP inspection page. In ERP there is

provision for entering various inspection details, including garment defects, rejection reasons, AQL inspection, and so on, and an inspection number is created in the ERP inspection page. Against the inspection number, inspection details are entered and saved. Based on the details of defects entered, system will identify pieces that can be sent for packing and pieces to be rejected based on pre-fed selection details. In some cases, this is manually done. Once inspection is done, details are submitted for the concerned manager's approval. Once approved by the manager, defective garments are sent for correction or to rejection stores. Non-defective pieces are issued to packing using issue to packing page.



- **Garment packing**

Materials required for packing are obtained by creating a store indent and it is issued by creating an issue note. Garments are packed with the packing material issued, and details of garments that are packed are entered in the ERP screen. The carton numbers used for packing are labeled by taking printouts from ERP. Once carton packing is done, material is ready for dispatch.

- **Packing list creation**

Based on the carton boxes packed, using the packing list creation page, boxes to be sent to the customer are readied and the list of boxes available under each packing list is saved on this page. The packing list number generated is provided to dispatch department through workflow for dispatch advice creation.

4.3.6.5 *Related masters, transactions, and reports*

The apparel-specific masters, transactions, and reports are provided as follows:

The masters are operation bulletin master, style category, style, section, subsection, attachment type, category, group, and so on. Transactions include bundle tracker, preparing markers, operation bulletin preparation, production operation mapping, and so on. Reports specific to apparel are operation bulletin report, size chart, measurement chart, costing of fabric, trim, CMT, combination wise shipment status, and so on.

Note. For a composite industry having all the verticals, starting from spinning to garmenting, ERP has options for each vertical to execute separate orders received from their customers and also do back processes for executing a garment order. Based on the garment order, orders can be created for all other verticals; for example, spinning mill can take its own order from any third party and also process an order for yarn requirement received from their garment or weaving company. In the case of internal orders, internal POs, goods received notes (GRNs), and internal dispatch activities are carried out. Options are available for each vertical to create an internal invoice if required to be billed to the respective vertical that placed the order (for weaving vertical, order could have been placed by a fabric processing vertical or garment vertical), and the final invoice to the customer will be created by the garment vertical that would have received the customer's order. Data redundancy and data re-entry can be avoided if own orders are received, as details from garment orders can be fetched when internal orders are created by other verticals like spinning or weaving.

Summary

The chapter discusses the role of ERP in textile and apparel business in detail. The various vendors related to textile and apparel ERP and cost details are specified. Process flows of all major textile and apparel verticals are explained with flowcharts. Vertical-wise changes in ERP are highlighted. The role of ERP consultants is discussed. The various vertical-specific masters, transactions, and reports are listed. The various process flows that apply to different verticals are discussed in order to give a better understanding for the readers who are keen to know more about ERP processes in a specific vertical. The working of ERP for major verticals like textile and apparel, including spinning, weaving, yarn and fabric dyeing, knitting, and garment, is explained with sample figures and flowcharts.

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5. www.exilant.com
6. www.premier-1.com

In this chapter, the process of implementing ERP is discussed. Initially the chapter discusses the change management process as employees of a company get ready to use ERP. The process of evaluating and selecting the right ERP for a textile and apparel company is explained in detail, as it will be very useful for selecting the right type of ERP with appropriate features. A business process study to be carried out before ERP implementation is described with specific focus on customizing ERP to be effective for company's operations. The implementation process starting from software explanation is discussed along with the training process different users go through to use ERP effectively in the organization. Post-ERP implementation activities are also briefly discussed for a complete understanding of the process of implementation.

Keywords: Business process study, implementation, ERP customization, ERP selection

5.1 Change management

Implementing ERP in an organization becomes a complex task when employees are not ready for change in their existing work practices and operations and processes. The top management might at times implement ERP just because competitors have it and just to uphold their market status. In those cases, top management will also be reluctant to implement best practices possible with the use of ERP. It is essential that everyone in the organization, starting from the MD/CEO to the last employee in the chain of hierarchy, should be willing to implement ERP and put it to best use for the benefit of organization.

There will be a lot of hesitation from employees when they come to know that ERP is implemented in the organization. A sound change management process should be administered to avoid ERP failures. The process involves preparation, management, and reinforcement. Change management alludes to an arrangement of essential tools or structures that can aid in control over any change that is implemented. Failure of ERP applications is not because of technology, fund, internet, application software, or software implementation but the mindset of enterprise or the user organization. Majority of ERP implementations that have failed are because of employees' resistance to change. The workforce gets resistant instead of being supportive.

The resistance to change is evident through persistent denial of benefits of using ERP, anger on having to put in extra time and effort for implementing ERP, bargaining to see whether there is an alternative, and getting reluctant to use ERP and senior employees expressing disappointment that after putting

in so many years of service their talent or expertise is unnecessarily tested and monitored via ERP or that management does not trust them any more. Employees' mental blocks and/or wrong assumptions about ERP processes are a major reason for resisting changes that arise by ERP implementation. Employees tend to assume that ERP means heavy automation and less manpower and thus ERP will take their jobs away, like fear expressed by labor force on account of active use of computers in different processes during the later part of the 20th century and that ERP will lead to unnecessary and excess work, will create problems, will capture their wrongdoings or faults in operations, and will not help in any way to perform their individual tasks better. This can be noticed during the implementation stages where workforce will likely try to raise many issues to question the efficacy of using ERP in their work processes and insist that there is no need for ERP.

Hence, the process of managing change becomes essential. How workforce can be managed effectively in such cases is illustrated in Figure 5.1



Figure 5.1 Change management process

The first stage is assessing the level and type of change required. It is the process of studying to ascertain whether there is indeed a need for ERP in the company. Once it is identified that there exists indeed a need for ERP, preparation for change is done by educating the workforce or the target audience by conducting introductory sessions, meetings, and interactive sessions where the views of workforce trained are sought on implementing ERP and its benefits. Thus, workshops are conducted to explain the benefits

of ERP to the workforce. Feedback is given on the views expressed by the workforce; therefore, training and holding interactive sessions and workshops to educate the workforce on the benefits of using ERP is a collaborative way of making necessary changes happen to put ERP to best use in the organization. A consultative approach can also be adopted, wherein the workforce or trainees are asked to come forth with their views on implementing ERP and benefits of doing so. If workforce is not willing to implement ERP, directives can be given or if needed workforce can be coerced to use ERP after its implementation. When the workforce is sufficiently educated about the benefits of using ERP and to help them disregard their earlier wrong assumptions, they feel encouraged and develop trust in ERP and become supportive in the ERP implementation process. The process of planning, implementing, and sustaining change for success will then become easy if the workforce is convinced of the benefits of using ERP.

5.2 Evaluation and selecting the right ERP

ERP systems available in the market are mostly high-cost products, and costs range anywhere from Rs.5 lakh to Rs.3 crore and above, depending on the requirements of the company, including type of business and industry, company size, and various other factors. Apart from this, there will be annual maintenance cost (AMC) imposed by the ERP vendor for providing updates to software time and again and solving bugs reported by end-users. As ERP involves a huge cost component, it is essential to evaluate and select the right kind of system in line with the specific needs of an organization that intends to use ERP.

If management does not carefully evaluate various ERP systems and vendors and choose an unsuitable system that doesn't provide comprehensive reports as required and involves more labor to input data and the task of entering the data is cumbersome and the ERP system requires the industry/organization's processes to align towards the ERP system rather than the ERP system aligning towards the company processes, it will lead to loss of revenue, time, and effort invested. In such cases, the ERP implemented will eventually become redundant and useless given its incompatibility with the type of operations in the company. The initial investment goes waste along with AMC costs and salaries paid for technicians appointed to manage ERP. Furthermore, all these costs will become additional over heads and increase production costs without adding any value to the final product. Wrong selection would lead to severe loss and unrest among employees as they are key end-users.

5.2.1 Pre requisites for evaluation

Evaluating various ERP systems and selecting the right ERP is a complex process involving more planning and time. Selection criteria of ERP vary

from one industry to another. Stand-alone, unique ERP solutions are not available for all companies, even if similar kind of products are manufactured by other entities; this is because there will be lot of differences in the processes followed, management approach, and so on. Thus, it is essential to customize ERP solutions to suit the operational needs of an organization's management and its end-users.

There are two basic prerequisites to evaluating ERP systems before purchase:

1. Management of the company should do initial planning prior to assessing ERP vendors and selecting the appropriate vendor
2. A team must be formed to carry out a detailed analysis of management requirements and operations and processes where end-users are involved

5.2.2 Initial Planning

Before evaluating the available ERP systems, management has to carefully analyze and answer the following questions:

- Decision has to be taken whether industry-specific solutions are required or whether solutions that apply to specific departments or business areas are required.
- Decision has to be taken whether ERP is going to integrate multiple locations, multiple verticals, and multiple business units under the company.
- Select the departments that ERP has to cover. It means that management has to decide whether the selected ERP product should cover all the operations of a company, such as sales, procurement, inventory, production, inspection, dispatch, maintenance and utilities, export documentation, finance, and pay roll, as there are ERP systems that cover only technical modules (production, maintenance) or commercial modules (sales, inventory, procurement, finance, pay roll).
- Size of the company and the potential ERP users.
- The technology available with the company, such as number of computers, processor type, memory capacity, internet bandwidth, and so on,
- The total cost that can be spent on implementing ERP.
- Decision on when the ERP order has to be finalized or the deadline for starting the implementation.
- The time limit that can be utilized for implementing ERP.

- Formation of a team for evaluating and aiding ERP implementation.
- The goals of the company should be listed along with what does the company expect from an ERP solution.

5.2.3 Formation of a team and detailed analysis

This process requires the management to form a team with bright individuals from each department of the industry. These individuals should go the extra mile to complete the activities and they should also be well-versed in departmental functions. They should be with a great foresight to predict the future requirements. The team should have a manager leading them, and the manager should directly report to the CEO of the company. The team should perform the following functions to aid with ERP evaluation and selection:

- Team members need to learn the reasons and conditions existing within the company that led to the decision to evaluate potential ERP systems.
- The objectives and vision of the company.
- Benefits that an ERP solution can provide.
- Technology available with the company and expenditure required for implementation.
- Company's resources need to be identified and assessed.
- The critical factors in business's ongoing growth need to be analyzed.
- In addition to unique areas of business within the company, the following also need to be assessed: Key strength of the personnel and the areas with scope for improvement, understanding current information management infrastructure, critical processes and workflow within the company, and potential ways to measure business performance.

These analyses are essential and a comprehensive report should be prepared and reviewed by the top management. Based on the analysis the evaluation and selection of the most suitable ERP solution can be carried out.

5.3 Process of evaluation and selection

The following steps can be used as a guideline for evaluating and selecting the right ERP:

- Clearly understanding the need for ERP
- Listing down business objectives and identifying various vendors with potential to provide the right ERP for the company

- Enumerate the requirements that ERP system can fulfill and prioritizing the same
- Compare between various solutions and short-list the best solutions available from which to choose the most suitable one for the company
- Analyze short-listed solutions in detail (analysis, solution selection, negotiation)
- Select the right ERP based on the analysis

Defining the need of ERP and defining the business objectives will be done as a part of determining the prerequisites for evaluation. So the evaluation process mainly concentrates on choosing the various vendors to evaluate, enumerating the requirements of ERP and prioritizing it, comparing and short-listing solutions, analyzing the short-listed solutions in detail, and selecting the right ERP based on analysis.

5.4 Choosing various vendors for evaluation

The first step is to find out potential vendors. Various means are available to identify vendors, including websites, positive references, magazines, exhibitions, sales calls received, newspaper, conferences, workshops, and so on. The ERP team manager should prepare a list of vendors. The list should have vendor's name, address, website, names of companies already using a particular vendor's ERP, important features in the package provided, and vendor's product brochure detailing special features of their ERP solution. All these details can be obtained from vendors' websites or references.

After collecting details, the ERP team should call the vendors for demonstration. Prior to demonstration, it should be clearly confirmed whether the elements required to meet the company's goal are available in the ERP.

The following should be noted down when the vendor gives demonstration:

- The basic usage of particular ERP
- Time limit for implementation
- Cost of basic package and cost of customization to modify existing features or provide add-ons
- Reports that can be obtained (regular reports and detailed analyses reports)
- Various modules available in ERP
- Limitations of the particular ERP
- Amount of manual data entry required

- Suitability of the particular ERP to the textile verticals of the company (it has to be checked whether the ERP has all the features needed to carry out the required transactions and generate reports for their verticals, such as spinning, weaving, garmenting, or processing units)
- Service support and maintenance (AMC cost)
- Whether billing for implementation is hour-based (vendor charges for each hour the implementer spends in the company; avoiding time-based charges will be advantageous for the company)
- Positive references for the vendor where their ERP software is already running (it is important to personally call those companies and verify how the ERP software is working for them, including checking whether the vendor's is effective, whether there are bugs and how long does the vendor take to fix them, overall functionality of the ERP system, its ease of use, types of reports that can be generated, etc.)

Once these details are collected, ERP team should compare and short-list the most suitable solutions.

5.5 Compare and short-list solutions

After collecting the required details, the ERP team should check and find out which ERP software is most suitable for their purposes. A series of activities need to be performed for determining the best possible option. They are as follows:

- Company's goal listed earlier should be achievable by using ERP (it should aid in achieving the goal).
- Expectations on what the team wanted from ERP should be met (it should be understood that ERP will only aid in decision-making but not make decisions by itself. It will not take a stick to hit a person when he or she makes a mistake).
- Limitations of each of ERP solution short-listed should be analyzed.
- Time limit for implementing should be checked.
- The scope of future expansion/upgrade possible with the ERP chosen (i.e., whether it can be modified or upgraded and enhanced in line with changes and growth in business or whether it can cover in its scope the functions of new verticals into which the company might wish foray in the future).
- Quality and efficacy of ERP vendor's service and ongoing customer support activities should be evaluated.

- Cost of ERP software (as cost increases, features will increase. Companies should work on finding the software that is suitable for them at optimum costs).
- Cost of hardware, software, IT technician, licenses, and database should be analyzed.
- Pricing is decided based on the number of licenses given, customization cost, maintenance cost, training cost, and infrastructure.
- The cost drivers can be understood with the help of Figure 5.2. All the costs shown in the figure should be taken into consideration during the selection process.

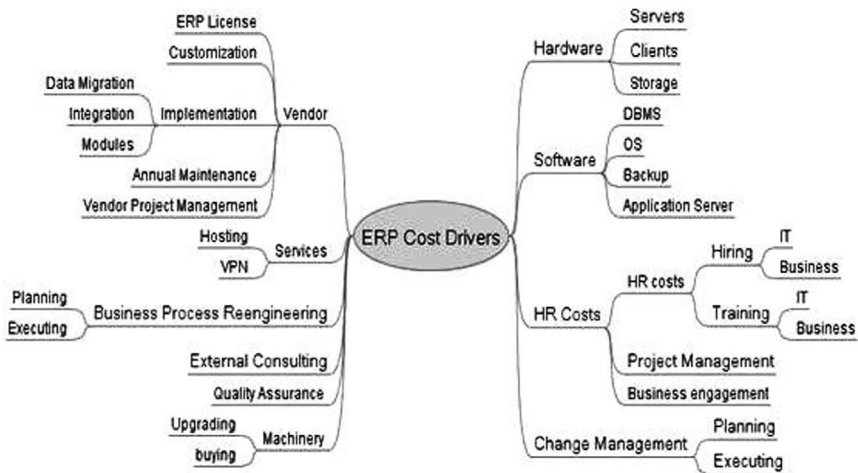


Figure 5.2 ERP cost drivers

5.6 Solution selection and negotiation

By now, the ERP team can reduce the number of potential vendors to a maximum two or three out of the various ERP providers short-listed. The team should discuss the details with top management and call these potential vendors for final negotiation. During negotiation, features, benefits, cost, and time frame for implementation should be clearly discussed with the vendors. Also, a visit to the companies where the ERP vendors have already implemented the software will give a clear idea on its functionality and usage. A detailed presentation should be done by the vendor covering the following aspects:

- Product features
- Various reports that can be configured and obtained

- Additional costs required for any extra features
- IT infrastructure required and cost of hardware, software, database, licenses, and so on
- Time for business process study and customization after study with related costs should also be informed
- Selected ERP should suit the size of business, number of employees, revenue generated per year, and all the textile verticals of the company

Upon conclusion of discussions, final negotiation should be conducted to fix costs. Once cost is decided, ERP team should select a vendor based on all the above aspects in discussion with the top management, and the main focus will always be on the value for money spent. After selecting the vendor, purchase order is placed. These processes will help in selecting the right ERP for the industry and help in easy implementation, as a wrong step taken in selecting the ERP will lead to losses.

5.7 Business process study

Once purchase order is released and after finalizing the time schedule for implementation, the vendor starts a business process study and prepares a document highlighting the gap between ERP and industry requirement. Business process study is known by different names, such as gap study, requirement study, as-is-to-be analysis, customization study, and so on. By this time, the industry would have a clear idea about the various modules in ERP and will nominate one person as the “module lead” for each module. The module lead will finalize requirements for the ERP system. The module lead will be normally hired from middle-level management, for example, managers who are heads of specific departments. There will be a “project lead” too, who will be nominated to handle the entire ERP implementation process in the company. The project lead will normally be holding positions such as operations manager, assistant general manager, or IT manager based on the industry.

Role of consultants. A freelance consultant or a third-party ERP consultant can also be employed by companies that lack expertise in selecting the right ERP. These consultants help in selecting the right ERP at best possible costs and also provide assistance to ensure smooth implementation of ERP. They act as a mediator between the client and the vendor. Consultants are paid by the client based on services provided.

5.7.1 Stages of business process study

The process of studying business processes is explained in [Figure 5.3](#).

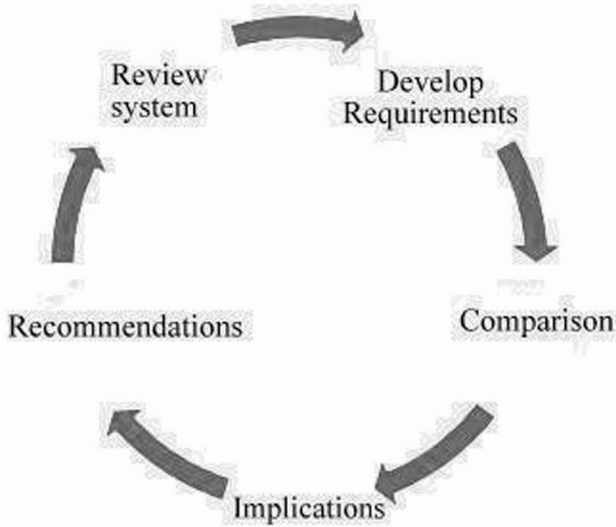


Figure 5.3 Stages of business process study

- i. *Review system*: The consultant from the vendor along with his team will visit client premises and take a tour in each and every department to understand client's business processes. The team will understand the existing system followed by the client. The module leads will assist the consultant in providing the required details.
- ii. *Develop requirements*: Based on the existing system used and business processes followed by the client, the consultant will develop various requirements that the client wants to ERP to fulfill, such as reports, process changes in ERP, workflow alterations, and so on.
- iii. *Comparison*: Once requirements are gathered, already existing features in ERP will be compared with client's requirements. In some cases, during the "review system" stage, consultant shows transactions in ERP system and check whether the client can use those. If not requirements are also generated from that. After comparison, the gaps to be filled or client requirements to be met are analyzed.
- iv. *Implications*: The functional consultant analyzes client requirements. The consultant performs a critical role, as he is the only person who understands both client's requirements and facilities available in the ERP system proposed to be implemented. He studies the implications

of making changes proposed by the client. For example, the consultant analyzes the following and checks

- whether it is possible to incorporate the requested changes into the ERP system
- whether changes requested will alter the basic functionality of the ERP system
- whether changes requested are user interface–level changes, code-level changes, and so on
- whether it is possible to execute tasks related to changes proposed
- how long will it take for changes to be incorporated into the ERP system
- financial/cost implications for the vendor to carry out changes requested by the client.

The consultant will also discuss with his software team and higher officials of his company to discuss whether changes proposed by client can be incorporated.

- v. *Recommendations*: Based on the output from analysis and discussions with his company, consultant gives his recommendations to client. He states changes that can be made as well as cannot be made; in the latter case, he provides reasons for the ERP's inability to accommodate them. Many times, state-of-the-art ERP software providers have the best process flows available in their ERP package. The client may not be following such processes. Therefore, the consultant educates his client about best practices incorporated and followed in the industry in relation to the optimum utilization of features available in the ERP system. The clients accept consultant's proposal if they find it beneficial. The consultant then negotiates with the client and finalizes client requirements. It is a very delicate step and should be handled with care by the client as well as vendor before finalizing requirements to be implemented in the ERP system.

Business process study helps in mapping customer's requirements and features available in the ERP system. [Figure 5.4](#) highlights the mapping process. Organizational requirements are mapped with ERP and the final changes required from the client organization for incorporating into ERP are clearly documented as shown in [Figure 5.3](#). If the business process study is not done properly, ERP implementation becomes difficult and eventually fails. The time required for conducting a business process study ranges from a week to a couple of months, depending on the size of company's operations.

Organizational Fit/Gap Analysis

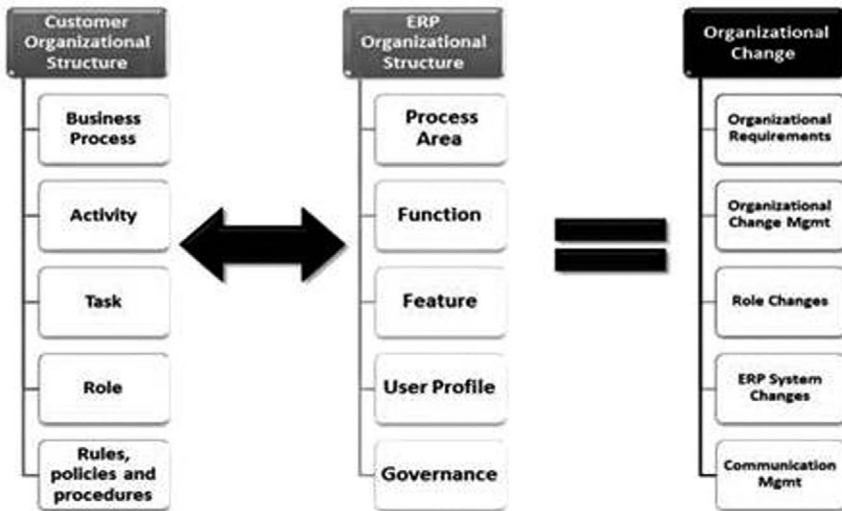


Figure 5.4 Mapping process

5.7.2 As-is-to-be analysis

SAP follows this **as-is-to-be** analytical methodology, which involves preparing a business process requirement document based on recommendations put forth by the client. This document is signed by the project lead on behalf of the client and the functional consultant on behalf of the vendor. Figure 5.5 shows the document prepared by the consultant, which states things already available, “as-is,” and changes to be made, “to-be”. This document is kept as reference till the end of implementation to ensure that “to-be” conditions are met completely. Similarly other companies use different formats of business process requirements document.

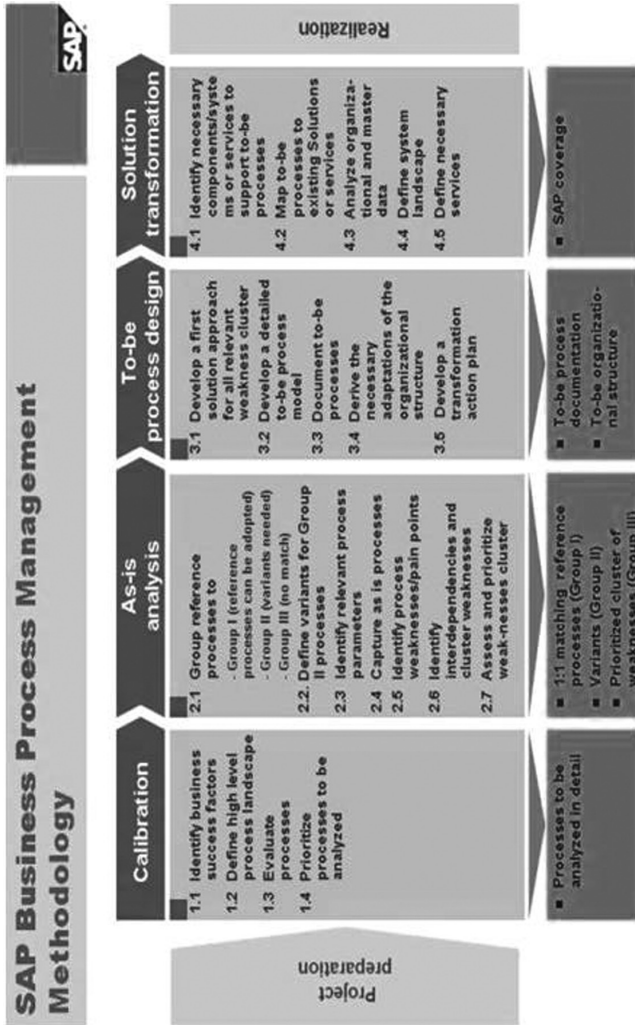


Figure 5.5 As-is-to-be document

Table 5.1 shows the business process study requirement document highlighting the customer business model mapped to ERP software with requirements provided under implications. This is a different kind of format and is signed by all concerned. The consultant goes back to his location to develop the software based on this document. Furthermore, inputs from gap analysis and modifications proposed and mutually agreed between the client are built into the ERP and thus the implementation begins. All the above steps can be effectively accomplished only with top management’s support and involvement. The MD/CEO of a company should ensure that the information about ERP is properly circulated to educate all employees about the benefits of using ERP and motivate them to put their best efforts for its successful implementation.

Table 5.1 Business process study requirement document

Customer business model			Map to EPR software		Impact analysis
Functional area	Activity	Role	Feature	User profile	Description
Catalog management	Catalog item creation	Item manager	Add and maintain items	Item master manager	Need to update policies/procedures/training for item master managers
Vendors/e-supplier	Procurement and payables administrator adds/maintains quality	Supplier manager	Add and maintain vendors	Supplier manager	e-Supplier/setup portal for suppliers/new policies and procedures/training
Purchasing	Indirect requisition	Inventory analyst/production control	Manual requisition for item	Purchasing agent	Require policy changes/training
Supply planning	Direct requisition	Account planner	Planning requisition	Planning requester	Policies/procedures/education and training
e-Procurement			Maintenance management requisition	Maintenance planner/schedulers	Customer's engineering and distribution teams will have responsibility for changes. New policies/procedures/education and training on inventory versus non-inventory
Replenishment requisition	Inventory control	Inventory planner	Replenishment requisition	Inventory requester	Policies/procedures/education and training

5.7.3 Customization

It is the process of making changes in ERP software to accommodate and execute client's requirements. Client requirements can range from the level of giving one extra field to enter remarks to generating detailed and in-depth analysis reports. Many ERP software providers have created customizable software where user can customize buttons that need to show up on the screen and use features that generate reports focusing on specific processes covering specific periods and add grids in transaction by having two levels of functionality. Therefore, user-level functionality and system-level functionality are provided and this in turn helps user to make changes within the limits of functionality without altering system's functionality. However, during the phase of business process study or during implementation, customer would come up with new requirements and would like to customize some features of ERP. In that case, the consultant who came for business process study should study the feasibility in the system and explain it to the client. He should educate the client on the cost involved for customization. If mutually agreed between the client and the consultant, customization can be done.

It is imperative to discuss the time and cost factors for customization during the purchase of software as well as during business process study so that implementation does not get delayed or failed.

5.8 Implementation

The consultant conveys client requirements to his software team to develop features in the software to incorporate changes requested by the customer. Development time will vary based on the complexity of changes proposed. A software requirement sheet is prepared and given to software developer. Consultant explains client's requirements to the implementation team, which consists usually an implementation coordinator and a group of implementers well-versed in implementing the ERP software.

In the case of small ERP vendors, different roles such as functional consultant, implementation coordinator, and implementation consultant are handled by one individual only, and this individual implements all the modules. On the other hand, large-scale ERP providers like SAP have individual consultants for implementing individual modules; for example, a material management module will be implemented by a material management consultant whereas production planning will be implemented by a consultant well-versed in production planning.

Capabilities that an implementation consultant needs to possess:

- i. The consultant should be well-versed with the use and functions of ERP system.

- ii. He should know the business process thoroughly.
- iii. He should possess a thorough understanding of client requirements.
- iv. He should show patience and skills in training company personnel to use ERP.
- v. He should possess good communication skills.
- vi. He should have good training skills.
- vii. He should have strong negotiation skills.

5.8.1 Process of implementation

The implementation consultant contacts and informs client about when implementation can commence. The process of implementation involves the following:

- i. During business process study, templates are given to the client to put master data using Microsoft Excel. These data are obtained and uploaded to ERP system in Excel format
- ii. The consultant checks whether client is ready with hardware like server, LAN connection, internet, SQL server, and reporting tools like licenses for crystal reports if required.
- iii. He checks the ERP system and takes it to the client place.
- iv. He installs the application and does all the configuration settings.
- v. A super-user as well as company master and user master are created.
- vi. Client's IT personnel are taught how to create user ids, assign roles, workflow-approval authorities and are asked to create users for specific roles and workflow assignments.
- vii. Codification processes like material coding if not done earlier are completed. It is a complex task. For example, there will be thousands of materials in the company and assigning a unique code for each material is a complex task. The codification is decided based on material's group and category and material's group and subgroup. An example for codification is given here. Material code can be "08BE00ZZ0001" where 08 refers to material group spare parts, BE refers to material category "bearing," 00 refers to material group if any, ZZ refers to material subgroup like "ZZ bearing," and 0001 is the running number. Different codifications can be done based on customer requirement.
- viii. All masters are uploaded and training begins.

- ix. Consultant visits each department based on time allocated and asks process owners to enter data into the ERP system and shows them how system works. Process owners are clerical-level employees assigned for executing tasks such as creating purchase orders, sales orders, production reports, and so on.
- x. This training goes for 3 to 6 months based on company size and scale of operations.
- xi. Some ERP companies perform module-wise implementation. They implement sales module first. They train all users to use that module, show them type of reports that can be generated and that requirements proposed and agreed prior to implementation are all now available, and finally obtain module sign-off from the module lead, who confirms that all the processes have been taught and requirements have been met.
- xii. Companies like SAP have different consultants for different modules and so simultaneous implementation happens.
- xiii. Once all modules are taught to concerned users, all the required reports are shown to them and then parallel run commences.
- xiv. Weekly review meetings are held with all stakeholders to ensure on-time implementation.
- xv. Implementation status report and weekly review reports are sent to the top management of client organization and vendor to ensure smooth implementation process.
- xvi. It is the process of using the old system and also the ERP system for all transactions.
- xvii. During this time, handholding is done so that all users become comfortable with using ERP.
- xviii. ERP reports are obtained and verified in the existing system to check for correctness.
- xix. Errors if any from in the ERP system are corrected and finally the “go live” process is initiated and live run takes place.
- xx. Old system is not used and ERP is used for making all transactions, and reports are generated from it.
- xxi. Correctness is verified and process continues.
- xxii. Any doubts users convey are addressed by the implementer during this period and he educates the IT personnel on how to report errors and how to apply newer versions in the software when updates are received from the vendor.

- xxiii. Implementer gets the project sign-off document signed by the project lead and leaves the client place thereby completing the implementation process.
- xxiv. Top-level management commitment is very much required for proper implementation of ERP.

5.8.2 Challenges during implementation

The challenges faced during implementation are as follows:

- Underestimating the time and resources required for implementation
- Client not furnishing enough data during parallel run
- Client not investing time in training and change management
- Business philosophy changes
- Lack of support from senior management
- Compatibility issues with ERP modules

5.8.3 Pitfalls during implementation

The following pitfalls are noticed during implementation:

- Management does not want to change the business process
- Comparison of systems
- Over expectation on the ERP system
- Change of requirements/objectives
- Improper time management
- Providing improper data

The success of implementation lies on the following:

- Strong executive ownership by top management
- Proper management of the scope of ERP
- Minimizing customizations required from ERP
- Approved requirement study and minimizing changes at later periods
- Good user participation/engagement
- Following proper sign-off procedures
- Proper system testing by the vendor and the client
- Appropriate training to end-user and ensuring proper knowledge transfer

As a client, the following needs to be done by the top-level management:

- Educate the user team before start of implementation
- Nominate key person as module lead for ensuring timely implementation
- Adhere to schedule
- Manage changes properly by working closely with vendor and understanding the limitations of ERP software
- Close requirements and not generate functionality requirements when required

5.9 Post-implementation

The post-implementation process involves the following:

- i. Continuous usage of system by customer
- ii. Visits by implementation consultant if required by the client, based on agreement to clarify doubts and train users
- iii. IT administrator of the client reports errors or bugs to the vendor
- iv. Receiving bug fixes and updated versions from the vendor and installing them on the server
- v. Scheduled creation of database backups by client's IT team
- vi. Internal training by the module leads and IT team for new recruits or users or people who need training
- vii. Creating new reports as and when required by the IT team based on features available in the ERP system
- viii. Client going for AMC after one year of usage so that bugs are fixed on time and new versions/changes are provided by vendor without any additional cost
- ix. Monitoring and analyzing the system to ascertain whether there are any new functional requirements that need to be fulfilled by the ERP system. This is done by client's project lead and IT team
- x. Based on budget available, purchase orders can be released to vendor to make those changes to the system after consulting with the vendor

Summary

The chapter encapsulates the evaluation, selection, and implementation process of ERP. The need and the process of change management are explained clearly. The business process study and its allied documents are explained with

illustrations. Third-party consultant's role in implementation is discussed. The implementation process with its challenges, pitfalls, and success factors are discussed. The post-implementation process is also explained.

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Chapter 6

Benefits for textiles and apparel vertical

The chapter discusses specific benefits of using ERP for textiles and apparel verticals. It explains how ERP helps in decision-making for managers in the company. Industry-specific examples are given for better understanding of benefits of using ERP. It also throws light on the need for and importance of data analysis. The usage of reports in ERP is highlighted and various types of reports available in ERP are also described. It explains the usage of drill-down reports and dashboard reports. The chapter also explains how textile/apparel companies can utilize ERP to the maximum. Workflow and its usage in ERP are also discussed in brief.

Keywords: Drill-down reports, dashboards, benefits of ERP, reports in ERP

6.1 Benefits textile and apparel sector derive from using ERP

The overall benefits of using ERP for industries were described in the previous chapters. It is now imperative to deduce the various benefits that ERP software provides for textile and apparel industry in particular. ERP for textile and apparel sector provides benefits in three different ways.

- i. Data collection
- ii. Information presentation
- iii. Aiding decision-making

6.1.1 Data collection

The foremost benefit that ERP provides for textile/apparel industries is collection of data from all points of operations and converting them into useful information. Data are very important for getting vital information and taking decisions. In textile and apparel industries, there are various data generation points and it is very difficult to get the required data when needed; for example, if production department in spinning wants to find out the production of a particular ring frame from the date of regular production after erection to ascertain its return on investment to the company, it requires data for how many ever years the machine has run. It could be even 10 years. In the case of legacy systems, data were not entered in the ERP system and it would be very difficult to find the data required from which to draw production details. It would also be difficult to gather info on maintenance activities carried out, operators' efficiency, and machine utilization; therefore, collecting these data

would involve huge manual efforts and time. Hence, getting data at the right time might pose a problem, making it difficult for the company to obtain information critical to decision-making. By using an ERP system, reports on date-, month-, year-, and employee-wise (who operates a particular machine) production data, operator efficiency, and machine utilization can be obtained quickly, as complete data will be available in the ERP database.

ERP helps with obtaining real-time data rather than getting off-line data on operations that have already taken places. Production data can be obtained immediately through machine integration rather than waiting till the end of the work shift or the working day. Machine stoppage data can also be acquired in real time. Hence, ERP helps in data collection and storage for further processing and use when required. Various data are also manually entered into the ERP system. A key benefit to using ERP is that it enables generation of different types of reports that play a critical role in decision-making across the company, including time-, operator- or department-specific performance and level of efficiency as well as data on wastage. Various data are collected using ERP in a textile/apparel industry. ERP used in textile/apparel industry provides and/or has different built-in modules focusing on specific major functional areas, and the different modules that form part of a typical ERP in textile industry include the following:

A. Sales module

- Quotations made for every customer
- Costing details for each product (yarn, fabric, dyed fabric, garment)
- Customer details
- Sales orders made for each purchase order (PO) received
- Lab dips details for ensuring proper shade of the dyed yarn or dyed fabric or final garment
- Yarn details, fabric details (known as sort), dyed fabric details, garment specifications (tech packs of each order)
- Summary of buyer orders cancellation
- Data on buyer complaints

B. Planning module

- Delivery dates and order quantity of various orders
- Bill of materials (BOM) required for each order
- Quantity of each material available in the store
- Machine availability data
- T & A (time and action plan) scheduling and updates

- Production status of orders already in production
- Requirement for human resource/labor to execute orders (skills, availability)
- Production plan for order received
- Deviations or changes in production schedule

C. Production module

- Production data of each machine (from blow room to ring frame, weaving machine, processing machines, and apparel machinery)
- Stoppage data for each machine
- Data of employees operating machines
- Production order preparation, job card, and batch preparation (processing industry)
- Material consumption data
- Work-in-progress (WIP) values in each department
- Data on damaged or rejected pieces or pieces sent for rework in the case of apparel industry and data on re-processing of material in the case of dyeing industry

D. Quality module

- Reports on tests carried out in different test equipment (U% in yarns, strength of yarns, etc.)
- Yarn inspection records
- Fabric inspection data
- Dyed fabric inspection data
- Garment inspection data
- Accessory inspection data
- Goods received inspection data
- Supplier evaluation
- Customer inspection data
- Data related to control actions taken if the product's quality does not meet standards set by the company

E. Logistics module

- Packing materials data
- Packing list data

- Dispatch advice data
- Delivery challan data
- Invoice data (proforma, commercial, and shipping, in the case of export orders)
- Port data for export and import
- Duty drawback details
- Service charge details
- Letter of credit (LC) data
- Bill of lading
- Drawback register and receipt and claim data
- Freight recovery data

F. Procurement module

- Procurement requisition data for requests raised for purchase
- Request for quotation (RFQ) data from vendors for materials to be purchased
- Vendor or supplier details
- Vendor rating done by purchase based on vendor's performance
- POs released for purchase of materials
- Details of subcontract POs or job order POs for jobs or processes outsourced to vendors

G. Inventory module

- Stock availability data
- Store-wise records of stock
- Stock transfer data
- Store indent data
- Issue notes created for issuing material to department
- Return notes for getting material back to store
- Goods received note (GRN) for materials that came into the company premises
- Quality inspection of goods received
- Stock-update data after quality check

- Vendor invoice data for materials received
- Credit note and debit notes
- Purchase returns to the supplier
- Stock allotment based on orders data
- Pending orders data
- Stock audit and adjustments data

H. Maintenance module

- Machine details and machine groups
- Allocating machines to different departments
- Type of maintenance activities carried out
- Preventive maintenance plan
- Checklist for maintenance
- Budget for maintenance
- Maintenance schedule for all machinery in the company
- Data on maintenance activities performed
- Pending maintenance activities
- Breakdown maintenance and critical maintenance activities carried out
- Parts replaced or repaired in each machine
- Request for purchase issued to stores and obtaining material for replacement or repair
- Tools available for maintenance
- Quality inspection data after maintenance
- Trial runs after maintenance
- Employee data related to maintenance activities carried out, with data bifurcated machine-, department-, and unit-wise.

I. Utilities and costing

- Power consumption for all machines, including department- and unit-wise data
- Yarn realization details
- Waste details

- Alternate sources of energy consumption
- Boiler-related data
- Costing details for each product produced
- International commercial terms used
- Data related to freight on board (FOB), free alongside ship (FAS), and cost, insurance, and freight (C&F) pricings

J. HRMS module

- Employee details
- Salary and PF contribution data
- Attendance and leave data
- Data on earnings/deductions or advances received by employees
- Overtime details, payout, and auditing data
- Calculation of ESI, PF, bonus, over time, settlement, and arrears
- Attrition details and data for reasons of attrition
- Exit interview details
- Income tax calculations–related data
- Incentives and appraisal data
- Data on disciplinary actions taken against employees
- Employees’ pay slips

K. Finance module

- General ledger details, including details of journal memo, journal analysis allocation, journals, chart of accounts, journal batches, narration templates, cost center, profit center groups, and budget allocation
- Cash and bank details, including details of cash book, bank data, account mapping, fund transfer data, and bank reconciliation
- Tax data, including tax code mapping, tax authority, tax segment, tax recovery, and statutory taxation data
- Account receivables data, including data on invoice entry, bill passing, memo, tax form for receivables, receipts, sub-ledgers, accounting rule setup, and accounts receivables opening balance
- Account payables data, including data on invoice entry, bill passing, memo, tax form for payables, bank payment against reference, payment cancellation, and account payables opening balance

L. Export banking module

- Interbank currency data
- Bank interest details
- Bank charges details
- Export bank limits
- Bill of exchange details
- Discounting bills data

All the above data can be collected using ERP either through manual data entry or machine integration. These data are very useful for getting information and decision-making.

6.1.2 Information presentation

ERP benefits textile and apparel industry to a great extent by providing information required at the right time without any delay. Flow of information within company is essential for smooth functioning of company. Information collected through ERP is presented to concerned stakeholders when required. Information received from ERP is huge and voluminous. It gives a complete picture to a senior manager on what is happening in the company. Data received from the ERP system provide meaningful information to the user. A senior manager will have complete access to all information needed to manage processes effectively and make sure that company is working efficiently. Information is available either in the computer itself or sent via e-mails or communicated through phone or fax or in the form of reports or handouts. Some of the main categories of information presented to the stakeholder from ERP for taking effective decisions are as follows:

- i. Quotations given to each customer
- ii. Costing report
- iii. Sales orders prepared
- iv. Material availability reports
- v. Production orders prepared
- vi. POs prepared
- vii. Procurement requisitions prepared
- viii. Buyer complaints reports
- ix. Planning reports
- x. Stoppage reports for each machine
- xi. WIP reports

- xii. Quality test reports
- xiii. Packing and dispatch advices prepared
- xiv. GRNs prepared and stock details
- xv. Store indents, issue notes, and return notes prepared
- xvi. Maintenance activities carried out
- xvii. Human resource management activities carried out
- xviii. Accounts receivables information
- xix. Accounts payable information
- xx. Export banking procedures followed

Any information related to any activity in the company if entered into the ERP system can be retrieved at any time as meaningful information. The foregoing list is not exhaustive. The information can be presented to top management based on their requirement. For example, if top management wants to know the quantity of ring frames produced in the previous one month and compare it with the previous 12 months' average, it is possible by just configuring a report and sending it to the manager for viewing. So information presentation is the most important benefit that ERP provides, as there is no need for physical maintenance of documents, like hard copy of POs, sales orders, production orders, and so on. All of these can be maintained in the ERP system and retrieved when required. These can also be approved using ERP or digitally signed and stored in ERP. Even barcode stickers and doffing numbers can be automatically generated using ERP and printed on sheets of paper which can then be pasted on the doffed cloth rolls, which is a critical process in the weaving department.

6.1.3 Aiding decision-making

The most potential benefit of using ERP for textiles and apparel vertical is that it helps in decision-making. It gives enormous information to managers when they need to take quick and correct decisions without wasting time. Thus, the various reports obtained from ERP help in decision-making. It is the quality and types of reports generated from ERP propelled it to occupy such an important position in the industry today, as ERP is viewed as a critical tool for managing business operations. In ERP, any report can be obtained in relation to any type of activity-specific data entered into it. "You name the report, you will find it" is the catch phrase that can be used to highlight how ERP provides any kind of report extrapolating any type of data one wants to take decisions. Reports can be customized according to company's requirement. Some key areas where ERP aids in decision-making in textile/apparel industry are given as follows:

1. A quotation versus sales order report can provide data on how many quotations have been converted into sales orders. It can give details about which merchandiser or sales executive was responsible for getting an order. It highlights the name of the executive who has less conversion rate and thereby helping manager to take corrective measures.
2. A region-wise sales order report can tell a manager which regions are performing poorly and list the names of executives performing poorly in those regions. It helps managers to identify reasons for poor sales performance in a particular region.
3. A buyer-rating report can tell a manager how to fix the order price based on various parameters, including long-standing relationship, prompt payment, and so on.
4. An order-tracking report can provide details of delays in shipment/dispatch if any and enable the concerned manager to take immediate action to avoid further delays.
5. A quality deviation report on deviations or nonconformance against quality standards observed during quality-checking of products carried out the previous day or previous week will give the concerned manager a clear picture on faulty machines causing the defect and an opportunity to study the reasons for such faults so that remedial actions can be initiated immediately.
6. Material requirement list obtained through BOM calculation will help purchase manager to take a decision on items that need to be bought based on stock availability.
7. Delay in material delivery by vendors can be tracked and obtained as a report, which the purchase manager can use to question the concerned vendor and make sure that material reaches on time in future supplies.
8. Based on vendor characteristics and attributes fed into the system, ERP can help select the best vendor for a product that needs to be purchased; all relevant details, including vendor characteristics and attributes as specified by the purchase manager, can be fed while configuring the system. For example, in a weaving company for yarn purchase, if attributes fixed included average cost of yarn (particular count) purchased in the previous three years, quality of yarn (U% less than 8%), timely delivery (average time taken for delivery), time available for the material to be received, transportation cost and weight given to each of the attributes, system will process, evaluate, and suggest a suitable supplier for the next purchase of yarn based on previous yarn purchases done after considering all the aforementioned attributes. Such innovative processing of ERP system gives an edge for companies and helps them work faster. If purchase manager chose a different vendor

that was not suggested by the ERP system, then he has to enter the reason for choosing that vendor, which in turn can be viewed by the general manager or any higher official and verified and vetted. Thus, it provides more control as purchasing function in a textile unit is one area where some purchase personnel might indulge in wrong-doings or make erroneous decisions that lead to losses.

9. Production output details of each employee, for example, in sewing or production of ring frame, production stoppage or machine stoppage details for any period of time, comparison and measure of employees' operational efficiency and machinery utilization helps production managers take valuable decisions at the right time, which involves critical decisions like changing or transferring an employee to another operational point or embark on exhaustive machine maintenance to prevent or reduce future breakdowns.
10. Power consumption can be captured in ERP and that in turn helps to find out deviations from the standard for any machine and take suitable corrective actions.
11. It helps to plan the manpower and machinery requirement
12. It helps in deciding whether to make a product in-house or buy it from a vendor
13. It assists in deciding whether to outsource whole processes or give a job order to complete a specific part of a process
14. It helps in deciding whether to expand business to cater to varying and growing customer needs
15. It helps in handling customer complaints and gives complete details so that the concerned manager can take necessary corrective actions.

Thus, by using an ERP system in a textile/apparel vertical information can be obtained about any processes or sub-processes and production output, thereby accelerating the decision-making process to help company save time and cut costs and become more competitive. ERP does not only help in taking quick operational decisions; it also provides details to take strategic management decisions. It helps textile/apparel companies to think long-term and take decisions, including reducing carbon footprint, increasing productivity, automation in processes, and so on. It provides immense help in gathering business intelligence by providing various types of analytical reports that help top management to make strategic decisions for the long term as well as short term. Just to give a brief idea about the various analytical reports that can be obtained in ERP, a list of analyses that can be carried out to aid decision-making in finance and HR domains is provided as follows:

1. Time and labor analysis
2. Payroll analysis
3. Workforce gains and losses
4. HR performance analysis
5. Operations analysis
6. Compensation analysis
7. Receivables analysis
8. Recruiting analysis
9. Learning management analysis
10. Leave and absence analysis
11. Proactive intelligence
12. Asset lifecycle management
13. Credit to cash management
14. Financial control and reporting
15. Financial analytics
16. Governance, risk, and compliance
17. Travel and expense management

Similarly, there are various other types of analyses that can be carried out and appropriate reports generated using ERP in order to aid senior management's decision-making processes in a textile/apparel company.

6.2 Reports in ERP

The benefits of ERP for textile and apparel vertical can be understood in totality only if appropriate details are disclosed in the reports generated from ERP. Reports are a most potent weapon that a manager has to help him take timely decisions and correct mistakes. Data analysis is a significant part of ERP. It is the process of inspecting, cleaning, changing, and modeling data for identifying and extracting useful information, making suggestions, arriving at conclusions, and supporting decision-making. Data mining and data warehousing have been explained earlier to get a better understanding on what type of data analyses are possible with ERP. Data analyses done using ERP can help to obtain meaningful information submitted in the form of reports for managers' use.

6.2.1 Types of reports

In this section, the various types of reports that can be generated from ERP are highlighted. Such reports are can be classified into three types and are as follows:

1. Routine reports
2. Information reports
3. Analysis reports

Reports can also be classified differently, notwithstanding the above categories: (a) classic reports and (b) interactive reports. Classic reports are normal reports, whereas interactive reports facilitate viewers/users sub-reports branching from main reports facilitating ready comparison between different parameters and processes.

6.2.1.1 Routine reports

These are normal reports covering data for a day or a week or a month for internal and external communication purposes. These simple reports furnish necessary details based on the context of the information sought. Classic reports are used for such routine reports. They don't have any sub-reports and are simple. The output is seen in a single list. These are transactional reports generated after carrying out a transaction. The example for a routine report would be a production order or quotation or sales order that is created and sent to the customer, supplier, or internal parties for giving information. Store indent, issue notes, return notes, which are commonly called as internal memos, are all examples of routine reports. All routine reports can be obtained from ERP. Some routine reports are listed here for better understanding.

Buyer PO Details											
Order Number: Company: Buyer: Order Quantity: 1000 Ex. Factory Start Date: 30-Sep-2013 Currency: EUR						Status: APPROVED Business Unit: HEADOFFICE Group: Merchandiser: Administrator Ex. Factory End Date: 30-Sep-2013 Buyer Season: WINTER-2013					
Buyer PO List											
Buyer PO	PO Date	PO Qty.	Buyer Location	Billing Address	Billing Postal Code	Billing Country	Delivery Terms	Payment Terms	Payment Condition	Approval Status	PO Status
12345	18-Jul-2013	475	AVENUE DES SABLES			FRANCE	FOB-FOB	LC AT 30 DAYS	30		INITIAL
Shipment Locations											
Buyer Location	Mode of Shipment	Shipment Qty	Shipment From	Shipping Address	Postal Code	Ship To Country	Shipment Date	Hanger	Shipment Status		
AVENUE DES SABLES	BY SEA	475	INDIA			FRANCE	31-Jul-2013	NO	INITIAL		
Style/Combo List											
SOLID											
Buyer Style/Combo	Size-Qty				Total						
38517-TOSD4E	1M-50(3.0372), 3M-100(3.0372), 9M-100(3.0372), 12M-150(3.0372), 18M-75(3.0372)				475						
										475.00	475.00
										Grand Total	475.00

Figure 6.1 shows a routine report that provides details of a buyer PO generated using ERP. The report shows all details related to the order received from the customer. It is also called the sales order. It gives details about shipment location, quantity, delivery date, product description, and so on.

Figure 6.2 shows another routine report that is used regularly and can be obtained from ERP; it provides details of a vendor invoice. Details about material received, PO number against which material was received, quantity, invoice rate, tax details, and total invoice amount are known through the invoice generated using ERP. It can be printed and signed by concerned personnel. Another routine report is related to procurement requisitions, which is used for creating POS. Once a need arises for material purchase, a procurement requisition is raised and based on the requisition received a PO is created. The procurement requisition report as shown in Figure 6.3 shows details related to material required, quantity, date when it is required, and the order against which it is required. These data are input into ERP and taken out in the form report. These are transactional reports taken commonly for transaction purposes. All these reports are taking care of day-to-day transactions in a textile/apparel industry. Some other routine reports used in textile/apparel industry are listed as follows:

1. Quotation
2. Job order report
3. Order acknowledgment report
4. Production order
5. Job card creation
6. Batch creation
7. Yarn dyeing batch creation
8. Store indent
9. Issue note
10. Return note
11. GRN
12. PO
13. Delivery challan
14. Packing list
15. Invoice
16. Dispatch advice
17. Work order statement
18. Maintenance schedule
19. Sub contract order
20. Delivery return report

Vendor Invoice Report

Vendor: _____ Bill No.: _____
 Bill Date: 14 Aug 2013
 Vendor Invoice No.: 121213
 Invoice Type: PURCHASE
 Vendor Invoice Date: 14 Aug 2013
 Invoice Amount: 35000.0000
 Status: CLOSED

Material List

GRN No.	GRN Type	PO No.	Material Type	Material	Vendor Qty.	Invoice Rate	Tax	Tax %	Tax Value	Discount (%)	Amount
HO1 3140000 14	PURCHASE	0042	FABRIC	1ACHB660202-100% COTTON - CHAMBRAY YARN DYED - 66 - 158X86 - 32S*32S	100.0000	350.0000					35000.0000
Total:											35000.0000
Total Invoice Amount: 35000.0000											

Remarks: _____

Prepared By: _____ Authorised Signature _____ Received By: _____

EXPORTS PVT LTD													
Fabric Purchase Requisition													
PR No :	20010	Merchant :	GRM										
PR Date :	28-Aug-2013	Department :	CUSTOMER TRADING										
Buyer :	INTERNATIONAL SA												
Buyer Division :	WOMENS CASUAL LINE WOVEN - JACKET												
Order :													
Quantity :	3.220												
Buyer Style :													
Delivery Date :	21-Sep-2013												
Material Details													
Fabric Description	Combo	Dis / Width in inches	Order Quantity	Compn - additional units	Final Compn	Required Qty	Grnt Usage/Gr	Final Required Qty	Requested Qty	Cumm. Requested Qty	Balance	Desk Loom Start/Close Date	Required Date
Shoulder yoke with quilting part_100% cotton - Neesha punch WOVEN RFD FABRIC PURCHASE/Shoulder Interlining Non Fusible GSM :	RFD	54	3.220	0.0022 + 2%	0.0022 MTR	100.0000 MTR	7.00	100 MTR	100.0000 MTR	100.0000 MTR	0.0000 MTR	28-Aug-2013	28-Aug-2013
TOTAL						100.0000		100.0000	100.0000				

6.2.1.2 Information reports

These reports provide all the necessary information on various activities in the company. They give details about production, planning, stock availability, stock transfers, and so on. They are also called as operational reports, which are obtained to check whether all the activities are happening smoothly. They are very important; they give a lot of information required for managers to run the day-to-day operations smoothly and without any deviations from the performance targets. Figure 6.4 shows an order-wise factory plan report of a garment company; it shows details such as order number, operation details, production start date, end date, style details, in-house planned quantity, produced quantity, and job work quantity. Such reports are very important for planning the orders correctly and to execute them. Figure 6.5 shows a stock summary report. It shows various fabrics available in the store along with quantity received, available, and the cost of fabrics. This report is very useful for creating purchase requisitions, as the stock is checked before placing an order.

Factory Plan

From Date: 1-Aug-2013 To Date: 24-Sep-2013

Order Number -Schedule No:

Style-Combo: KIDS BOYS TROUSER-

Operation	Start Date	End Date	In House Planned Qty	Reported Qty	Job Work Qty
SEWING	3-Sep-2013	3-Sep-2013	500	0	0

Order Number -Schedule No:

Style-Combo: kids shirt-NATT-BLUE

Operation	Start Date	End Date	In House Planned Qty	Reported Qty	Job Work Qty
SEWING	17-Aug-2013	5-Sep-2013	2,000	0	0

Order Number -Schedule No:

Style-Combo: MENS SHIRT-DITSY-MIDNIGHT

Operation	Start Date	End Date	In House Planned Qty	Reported Qty	Job Work Qty
SEWING	2-Aug-2013	11-Aug-2013	1,000	0	0

Order Number -Schedule No:

Style-Combo: KIDS BOYS TROUSER-T04734-RED

Operation	Start Date	End Date	In House Planned Qty	Reported Qty	Job Work Qty
SEWING	16-Aug-2013	16-Aug-2013	50	50	0

Material wise stock summary									
Material Code	Material Name - Fabric detail	UOM	Inward Qty	Inward Rate	Inward Value	Closing Qty	Closing Rate	Closing Value	
WAS123	Yarn dyed chambray	MTR	150	143	21450	150	143	21450	
WAS124	Microdot fusing White	MTR	50	20.69	1034.5	50	20.69	1034.5	
WAS125	Yarn dyed stripe	MTR	2160	170	367200	2160	170	367200	
WAS126	Solid Dyed black	MTR	1008	136	137088	1008	136	137088	
WAS127	Solid Dyed red	MTR	1256	136	170816	1256	136	170816	
WAS128	100% Polyester knitted	MTR	200	28	5600	200	28	5600	
WAS129	100% Polyester woven	MTR	200	28	5600	200	28	5600	
WAS130	Corduroy solid dyed abyss	MTR	110	350	38500	110	350	38500	
WAS131	Corduroy solid dyed gazon	MTR	110	350	38500	110	350	38500	
WAS132	Corduroy solid dyed Maki	MTR	104	350	36400	104	350	36400	
WAS133	Corduroy solid dyed Ocre	MTR	110	350	38500	110	350	38500	

Another report named QC rejection ratio is shown in Figure 6.6. This report gives information such as operation name, order number, inspected quantity, accepted quantity, and rejected quantity. It gives the style details for which inspection is made and also provides rejection ratio. Such information is very useful to know the quality of finished product.

QC Rejection Ratio

QC Date	Order Number	Buyer	Style	Operation	Cumm Done In House	Cumm Inspected Qty	Cumm Rejected Qty	Sampling Ratio	Rejection Ratio
Factory: EMBROIDERY									
24-Oct-2013	13	WORLDWIDE FASHION	GIRLS DRESS	EMBROIDERY	200	6,000	200	3,000.00	3.33
24-Oct-2013	13	WORLDWIDE FASHION	GIRLS DRESS	EMBROIDERY	3,000	3,000	100	100.00	3.33
24-Oct-2013	13	WORLDWIDE FASHION	GIRLS DRESS	EMBROIDERY	200	5,000	100	2,600.00	1.72
24-Oct-2013	13	WORLDWIDE FASHION	GIRLS DRESS	EMBROIDERY	3,000	2,900	50	96.67	1.72
Factory: SAMPLING									
Factory Line: SMP1									
21-Oct-2013	21	INTERNATIONAL SA	MENS JACKETS-MAINLAND-MAINLAND	SAMPLING1	21	21	0	100.00	0.00

The fabric MRL (material requirement list) report shown in Figure 6.7 is very useful for finding out whether materials required for executing a particular order are available. The list is generated automatically by the ERP software based on calculations and logics that are in-built in the system. The

report provided here shows the garment part, fabric category, order number, count, construction, fabric description, fabric content, finish applied, whether imported, color, quantity required, quantity available, wastage percentage, quantity ordered, quantity received, quantity approved by QC after checking material received for inspection, and so on. It is a comprehensive report used by merchandisers to order trims and accessories and by purchase managers to order necessary fabrics and other materials required to produce the final garment. Any number of material requirement lists can be generated as available quantity and required quantity keep changing. This list forms the basis of stock allocation and purchase of materials that are listed down. Such information reports obtained from ERP are very useful for managers to handle operations. Some of the other information reports that can be obtained from ERP are listed as follows:

1. Sort report/style report
2. Tech-pack data report
3. Buyer-rating report
4. Follow-up summary/status report based on every sales order
5. Sales order tracking report
6. Sales order summary report
7. Shipment status report
8. Planning report
9. Material consumption report (e.g., sewing thread consumption, fabric consumption, etc.)
10. T&A schedule
11. Stock summary report
12. Stock transfer report
13. Costing report
14. Order-wise costing report/consolidated report
15. PO status report
16. Vendor rating report
17. Pending POs report
18. GRN versus PO report
19. Pending requisitions (PR)
20. Stock audit summary
21. Stock returns

22. Quality and inspection report
23. Re-process summary
24. Item movement report
25. Production reports used specifically in the case of garment industry: daily cutting summary, cutting consumption summary, fabric stock/issue summary, bundling summary, cut-garments-issue summary, section-wise production, fabric-damage summary, sewing production, line-wise production, and so on
26. Lab inspection reports
27. WIP report
28. Dispatch status
29. Pending order status
30. Order closure summary

Fabric MRL															24-Sep-2013		11:26:09AM							
Order Number Company Buyer Order Quantity 3,180 Start Ex Factory Date 05-Nov-2013 MRL Version 3										Status APPROVED Business Unit Group Merchandiser End Ex Factory Date 08-Nov-2013 Buyer Season SUMMER-2014														
Buyer Style T25038-T25038 - BOYS TOPS																								
Fabric Details																								
Act	Int	Fabric	Count	Fabric	Procure	Content	Finish	Unit	Dial	Impo	Color	Mat	Cons /	Extra	Required	Final	Cum	Cum	Cum	Cum	Cum	Cum	Store	
ive	Part	Category	Consp	Descriptio	ment			Wt.	Width	ted		Code	Dist. In	%	Qty	Reel Qty	Requested	Ordered	In	QC	Transd	Releaso	Qty	
			lution	n	Process								CUOM				MTR	MTR	Store	Paried	MTR	ed		
Yes		FURIN G.	WOVE N	NA	Micro Dot	WOVEN FINISH FABRIC PURCHA SE	100% POLYESTER	NORM AL	44	No	100	W170NA	0.1131-M	0.00	3,180	301,000 MTR	2,00	308,000 MTR	308,000 MTR	50,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR
Yes		MAIN FABRI C.	WOVE N	400/4 SS	Poplin Yam Dyed	WOVEN FINISH FABRIC PURCHA SE	100% COTTON	PEACH	58	No	665	W16000	0.6563-M	0.00	3,186	2091,000 MTR	2,00	2133,000 MTR	2133,000 MTR	2160,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR
Yes		TRIM FABRI C.	WOVE N	50EX4 SS	Twill 2/1 Solid Dyed	WOVEN FINISH FABRIC PURCHA SE	100% COTTON	NORM AL	68	No	26A	W2010H	0.0220-M	0.00	3,186	71,000 MTR	2,00	72,000 MTR	72,000 MTR	78,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR
Yes		TRIM FABRI C.	WOVE N	200K2 SS	Chambray Yam Dyed	WOVEN FINISH FABRIC PURCHA SE	100% COTTON	NORM AL	58	No	240	W121212	0.0426-M	0.00	3,186	137,000 MTR	2,00	140,000 MTR	140,000 MTR	150,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR	0,000 MTR

These reports may not appear in a single page and will contain more information and, thus, will be shown in multiple pages. Any deviations from quality standards or performance targets can be highlighted and shown based on how these reports are configured. A simple example of production order report can be taken to understand the types of reports obtained from ERP. Consider a weaving unit for which production data are entered, including the following information: weaver name, machine number, stoppage time, stoppage reason, and order number. With these six types of details, the following key reports can be obtained: daily, weekly, monthly, and yearly production reports. Furthermore, using these six types of details, item or function-specific reports can also be obtained, including the following: machine-wise production, between-machines comparison, employee-wise production, shift-wise production, machine efficiency, stoppage, stoppage

reasons, machine-wise stoppage comparison, machine utilization, labor-wise efficiency in the previous three months, order-wise production, sort-wise production, plan deviation, material utilization, order-wise status, order-wise comparison, and so on. It is understood that once data are available, they can be converted into any report that contains useful information.

6.2.1.3 Analysis reports

Business intelligence coupled with ERP has taken ERP to the next level of not only making operational decisions but also strategic decisions, and for this purpose, the system needs to be built with all required features to understand business logic and provide analytical results. ERP systems are capable of performing various analyses using data available and can provide complex analytical reports that help companies to take strategic decisions. The analysis reports are reports that showcase both micro- and macro-level areas upon which a business needs to concentrate in order to maximize earnings. For example, based on the data available, they can provide details about the efficiency of a sewing machine operator and at the same time provide an analysis of how the operator's production has affected the overall profitability of the organization. Various analytical reports are obtained through ERP that help in taking strategic decisions.

Analysis reports are not obtained only in the form of classic reports. There are other formats available, such as drill-down reporting and dashboard reporting, to enable easy comprehension and analysis of data. [Figure 6.8](#) shows an analysis report named WIP valuation report that gives details about value of material available in the WIP stage in a garment company. Such report help a manager to compare WIP values of one month or one order with a similar order that was executed earlier in another month and find out how inventory has been used. If it is found that the value is high, it means there is a loss, since so much material is available in WIP compared to another period, which could have been a result of lower efficiency in production. It shows process-wise WIP value and details about receipts not produced, reworks not produced, material produced but not issued, and garments in transit. It gives the value of the material in the WIP stage. A variety of analysis reports can be obtained from ERP, and the following are some of the key parameters for which such analysis reports can be generated:

1. Budget deviation
2. Cost-control
3. Cost center-wise profit
4. Cost center-wise budget
5. Maintenance versus efficiency

6. Quotation versus sales order
7. Production versus quality
8. Budgets comparison
9. Stock value
10. Stock asset versus liability
11. Cost of reprocessing (e.g., dyeing)
12. Order versus material consumption
13. Order-wise costing versus profit
14. Quality deviation reports, including for machine-wise and operator-wise deviations.
15. Plan versus execution
16. Forecast report, which includes key details such as demand, profit, sales, and so on, is based on marketing plan. In the case of spinning unit, count-, country-, and customer-wise details can be obtained for both export and domestic market.

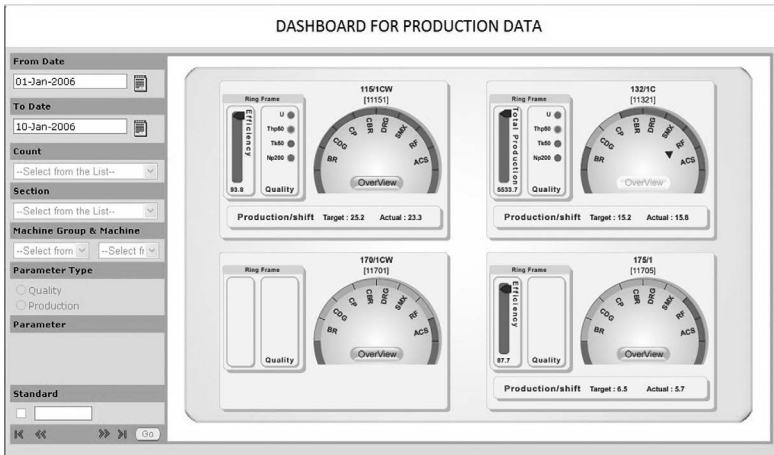
WIP Valuation report

Order : 0037		Style: 014		Schedule No: 1							
Number Combo: WHITE		Factory: CUTTING		Operation: CUTTING							
Size	Receipts Not Produced		Rework Not Produced		Produced Not Issued		Gmt With Job Worker		Intransit		Total Value(INR)
	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	
2A	NA	NA	0	0.0000	800	36,000.0000	0	0.0000	0	0.0000	36,000.0000
											Total Value(INR): 36,000.0000
Order : 0037		Style: 014		Schedule No: 1							
Number Combo: WHITE		Factory: EMBROIDERY		Operation: EMBROIDERY							
Size	Receipts Not Produced		Rework Not Produced		Produced Not Issued		Gmt With Job Worker		Intransit		Total Value(INR)
	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	
											Total Value(INR):
Order : 0037		Style: 014		Schedule No: 1							
Number Combo: WHITE		Factory: STITCHING 1-LINE A		Operation: STITCHING 1							
Size	Receipts Not Produced		Rework Not Produced		Produced Not Issued		Gmt With Job Worker		Intransit		Total Value(INR)
	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	
											Total Value(INR):
Order : 0037		Style: 014		Schedule No: 1							
Number Combo: WHITE		Factory: FINISHING		Operation: FINISHING							
Size	Receipts Not Produced		Rework Not Produced		Produced Not Issued		Gmt With Job Worker		Intransit		Total Value(INR)
	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	Qty	Value(INR)	
											Total Value(INR):
											Grand Total Value(INR): 36,000.0000

Similarly, there are various types of analysis reports that can be obtained using ERP integrated with business intelligence. If data are entered into the system, using that data, any report can be obtained.

6.2.1.4 Drill-down and dashboard report

Analysis reports are mostly presented as drill-down reports or in a dashboard format for easy comprehension. Graphical representations help the user understand details immediately. These are also called as interactive reports, as they enable the user to open a sub-report by clicking the link in the report and get information for the next level. For example, if a production report is displayed, wherein the order number is clicked, it will show machine-wise production, and when the machine status is clicked in the newly opened report/screen, it will show date-wise production made out of that machine. When an employee’s name is clicked, employee-wise production will appear as a new report; similarly, in a single attempt, a user can go in depth to understand information available in the report. Drill-down reports are used for navigating through data and jump to the next level of information or the next process or sub-process/activity. Dashboards are mostly single–page reports, easy to read, provide real-time user interface, and show information that is easy to comprehend and analyze. Dashboard can give details about production status, quality checks done, deviations found, and causes for deviations. The drill-down and dashboard reports are illustrated in Figure 6.9, wherein it is shown how a spinning mill’s production data appear in the dashboard.



The dashboard here shows count-wise production for the dates shown on the left. It gives department-wise production details and the quality of yarn produced. It is easy for the user to understand the target production per shift and know the actual quantity produced, which in turn helps him to take corrective actions if target is not met. Different colors are used to highlight production and quality achieved as well as deviations that have occurred and that there are no deviations. The dashboard can further be drilled down

as shown in Figure 6.10. In this case, by clicking the count, a new window opens, which is the first level of drill-down.

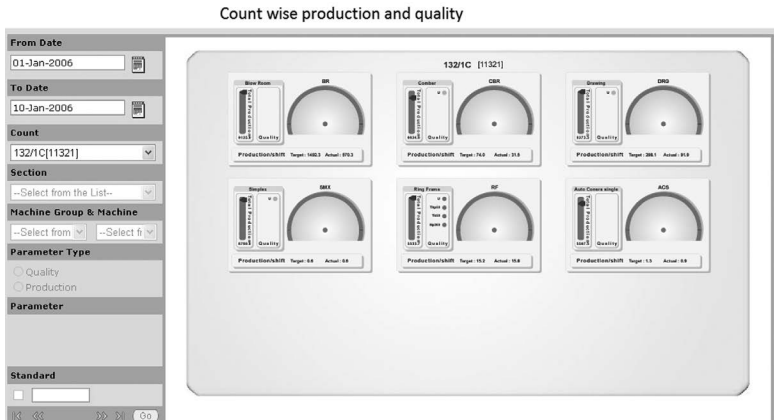
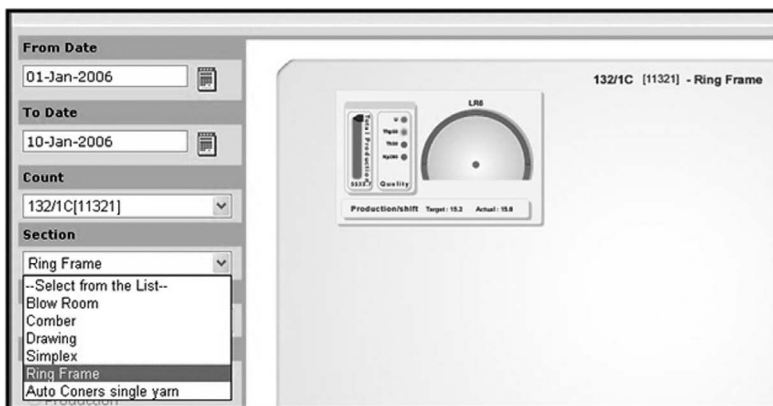


Figure 6.10 shows count-wise production of each department and the corresponding quality of output from each department. The second level of drill-down is shown in Figure 6.11, wherein a particular department has been selected for viewing. In this case, the ring frame section has been selected for viewing. The third-level of drill-down is also available and is shown in Figure 6.12. In this level, the machine group is selected and the parameter type is selected as production, and it gives details about machine-wise production of that particular count.



Machine-wise production is given for each machine; for example, selecting machine 1 will give all details about production in that machine along with all quality details of the yarn produced. By selecting the parameter type as quality, it will give all quality details pertaining to each machine in the

machine group; by clicking on the button for each machine, production details can be obtained. Using the parameter drop-down on the left, details can be filtered to show only the information related to a particular parameter.

It is possible to add more levels to drill-downs; an additional level is shown in Figure 6.13, wherein it is shown that machine-specific shift-wise or test-wise information can be obtained.

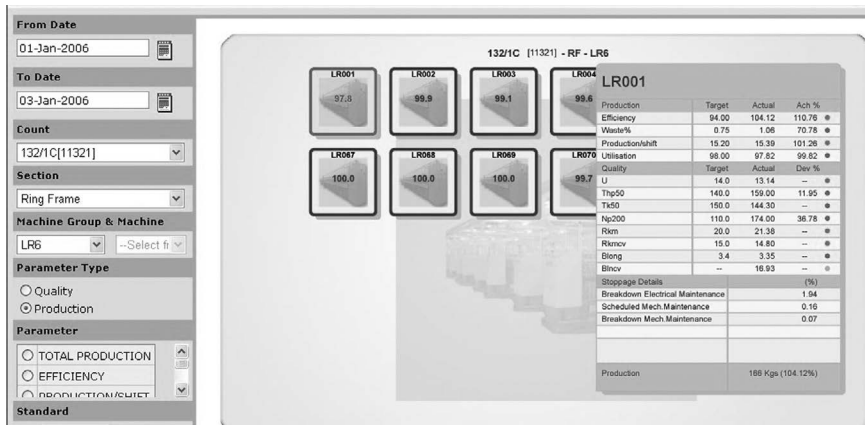


Figure 6.13 shows how a particular ring frame is selected and shows shift-wise and date-wise utilization details in a graphical format. Quality details can also be obtained test-wise. Such detailed information can be obtained through drill-down and dashboard reports. These reports not only give information but also enable users to understand specific areas of concern and take immediate action to correct them. The deviations highlighted in these reports are easy to understand and enable the user to take corrective action immediately. Similar kinds of dashboards and drill-down reports are used at various places. Some of them are given as follows:

1. Production drill-down reports
2. Sales order drill-down reports
3. PO drill-down reports
4. Stock reports
5. Dashboard reports for production
6. Dashboard reports for planning
7. Dashboard reports for quality checks
8. Drill-down reports for employee efficiency and appraisal
9. Dashboard reports showing sales versus actual

10. Budget and cost-control dashboards and drill-down reports

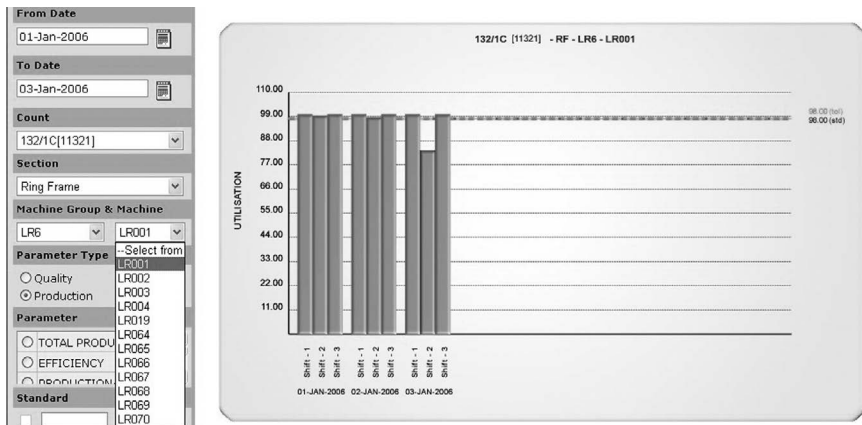
Any number of dashboards and drill-down reports can be created in ERP to make analysis easy and effective and ensure information is received at the right time and right place.

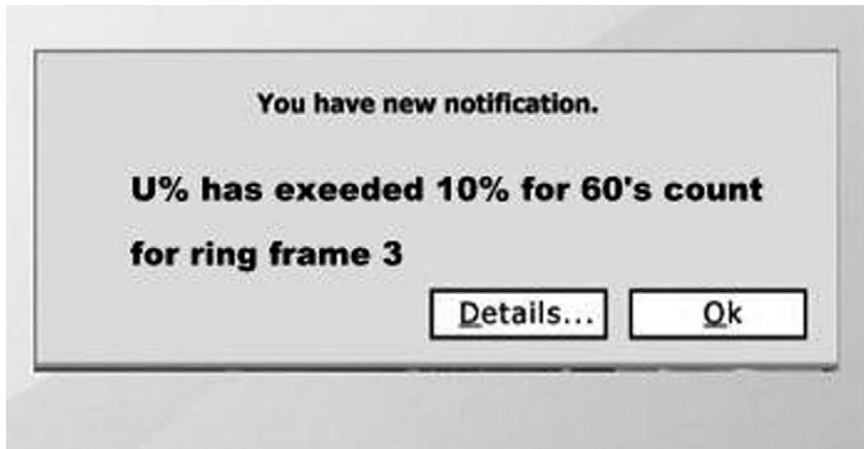
6.3 Workflow and notification usage in ERP

One of the most important benefits that can be derived from ERP in a textile/apparel company is the usage of workflow and notifications available in the system. The way how workflow and notification works is explained in the “Technology” chapter. Some of the benefits using workflow and notification are as follows:

1. Saves time in execution of orders, including PO, quotation, and so on.
2. Real-time information on production details
3. Real-time information on quality details
4. Quickness on order execution
5. Easy to identify deviations in planning

Figure 6.14 shows such a notification that comes on the screen when a user is using the system. When the user is working on his system, he will get a pop-up on his system screen as shown in Figure 6.14. He can either click on the details to take a look at the results or click “ok” and view it at a later time.





The various workflows that are possible with using ERP were explained in the previous chapter; the various notifications that can be received include or cover the following criteria: quality deviations, production deviations, materials ordered but not received on time, plan deviations, dispatch deviations, inspection deviation, excess production, or better quality achieved, and so on. A variety of other types of notifications can also be set and received, and these are very useful for managers to ensure work is going on smoothly and as planned.

6.4 Maximum utilization of ERP

Although there are so many benefits for using ERP in a textile/apparel industry, there are lots of additional points to be considered for utilizing ERP to the maximum extent possible. There are many areas to be considered and taken care of for putting ERP to best possible use and obtain all the benefits discussed earlier. A brief outline is given below, and by ensuring the following, maximum utilization of ERP can be achieved as well as quicker return on investment (ROI) and break-even.

1. Proper selection of ERP package.
2. Care should be taken during business process study and all requirements should be specified in the document.
3. All users should be sensitized about implementation of ERP and its benefits.
4. Proper IT team and project leaders should be appointed to take care of implementation.
5. Customization requirements should be clearly mentioned, and all the reports required from the system should be highlighted.

6. Although ERP provides so many reports, all reports are not available with all packages; many times, only by requesting specifically for a particular type of report, a vendor develops it and adds it to the system.
7. Time-bound implementation of ERP should be ensured.
8. Weekly and monthly review meetings should be held during the implementation stage, and necessary corrective actions should be taken if deviations are found at any point during the implementation phase.
9. All users should be properly trained and there should be dedicated data entry personnel to enter all the required data into the system. Alternate people should be trained to carry out this activity when there is absenteeism.
10. Managers should be trained on various ways of obtaining reports in ERP.
11. Frequent checks should be made to ensure that correct data are entered into the system.
12. After implementation, monthly reviews should be held to analyze problems noticed in ERP.
13. Continuous usage of ERP system should be carried out, and in no case an alternate should be used without top management's approval
14. Only those reports generated from ERP should be used; for example, if a store indent is not created by the production team, material should not be issued till creation the store indent in the ERP system.
15. Tight controls need to be established at department levels to ensure data accuracy and timeliness of entry.
16. Errors should be reported on time to vendors, and corrected versions should be updated and checked for the presence of any additional or existing uncorrected errors.
17. Workers should be trained and educated time to time so that they don't lose focus on entering data into the ERP system and also utilize the system for further information and analysis.
18. Production data of each and every machine, including for sewing, spinning, and weaving, should be entered on time with reasons for stoppage if any.
19. Details of maintenance carried out for a machine and parts changed as a result should also be entered into the system as it helps to track the usage of that machine in the long run.

20. Drill-down and dashboard reports may not be available with some vendors, and the textile/apparel companies can show examples given in this book for creating such dashboards and drill-down reports.
21. Quality reports should be frequently checked to see whether the users have made any mistakes voluntarily or involuntarily; for example, users may feed standard data deliberately to conceal details of deviation shown. In other words, for example, if machine integration is not available, a tester may enter U% as 8% for a particular test, which will be within standards rather than entering the actual result obtained, which is 12%, a clear deviation from the standard. Here it is obvious that the user wants to conceal quality errors observed.
22. ERP system will only process and analyze data fed into it. Therefore, if the data available in the system is inaccurate, the entire output will be inaccurate and will lead to huge losses for the organization.
23. Top management should be vigilant and strict in enforcing continuous usage of the system by all personnel in the company.
24. Reports should be frequently checked to see whether there is any data mismatch or errors.
25. IT department should proactively help users in overcoming any issues they face while using ERP.

By following the above points, maximum utilization of an ERP system can be achieved, which will undoubtedly result in cost savings and increased profits for the company.

Summary

The chapter gives a detailed account on the benefits of ERP for textile and apparel vertical. The various types of data collected using an ERP system are described, and how valuable information can be obtained from the data available in the ERP system and used for taking accurate, timely, and effective decisions is also highlighted. The chapter clearly explains the types of reports available in the ERP system, with special reference to the textile/apparel sector. How drill-down and dashboard reports can be used is also explained with an illustration showing how production and quality data obtained from a spinning unit can be presented in drill-down and dashboard reports. The specific benefits of using workflow and notifications for the textile/apparel vertical are also explained along with points to be considered for putting ERP to optimum use.

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Latest developments in ERP

In this chapter, the latest developments in ERP are discussed in detail. The concept of ERP II is explained. The ways customers can configure reports on their own are listed. The chapter also talks about how machine integration is becoming a key factor in getting real-time data. It also details how ERP is associated with acquiring business intelligence (BI). ERP's association with customer relationship management (CRM), supply chain management (SCM), and product lifecycle management (PLM) for doing better business is explained. The cloud concept is described by throwing light on Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). The latest development of mobile ERP is also discussed in this chapter.

Keywords: ERP II, Cloud, SaaS, PaaS, IaaS, CRM, business intelligence, machine integration

7.1 ERP II

The term ERP II was first coined by Gartner Research Group and was first mentioned in an article published by them in 2000 titled, “ERP is dead—Long live ERP II.” It is known as extended ERP. As discussed earlier, ERP integrates the operations of an enterprise within and across its business units and associate companies, whereas ERP II extends beyond the level of enterprise to swap information with customers and supply chain partners. Eresource.com defines ERP II as “A solution that includes the traditional materials planning, distribution and order functionality strengthened by capabilities like customer relationship management (CRM), human resource management (HRM).” ERP II reduces cost, improves supply chain efficiency, and performs joint innovation by extending the functionalities across the enterprises that are part of a supply chain instead of just operating within the enterprise. ERP focuses on operational excellence, whereas ERP II focuses on innovation. ERP II extends itself to all partners in supply chain and encompasses CRM and SCM packages. ERP II is a step toward creating enterprises without borders.

7.2 Comparison between ERP and ERP II

Figure 7.1 shows the difference between classic ERP and extended ERP II. The difference between ERP and ERP II is observed in the following areas: role, domain, function, process, architecture, and data. In the case of ERP, its role was enterprise optimization, whereas for ERP II, it is value chain

participation and e-commerce enablement. ERP concentrates more on manufacturing and distribution domain, whereas ERP II concentrates on all sectors/segments. ERP focuses on manufacturing, sales, distribution, and finance processes, whereas ERP II focuses on cross-industry, industry sector, and specific industry processes.

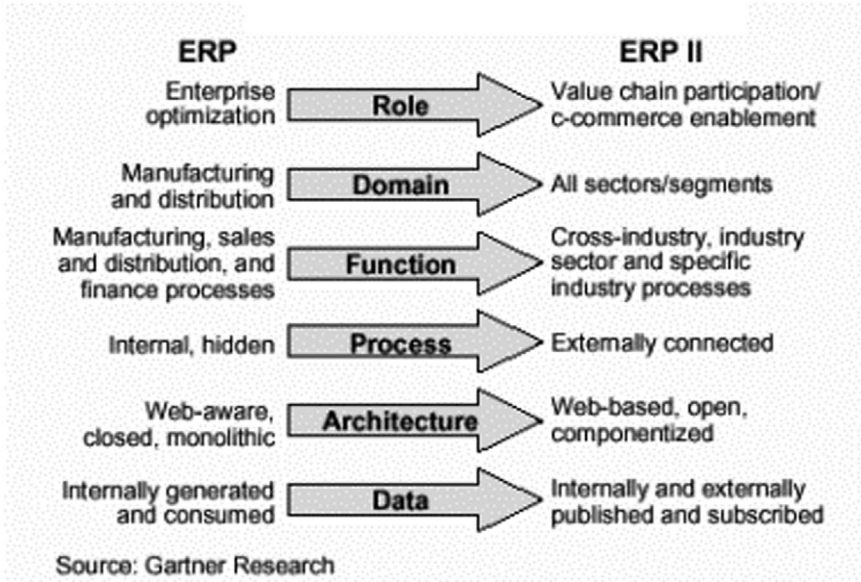
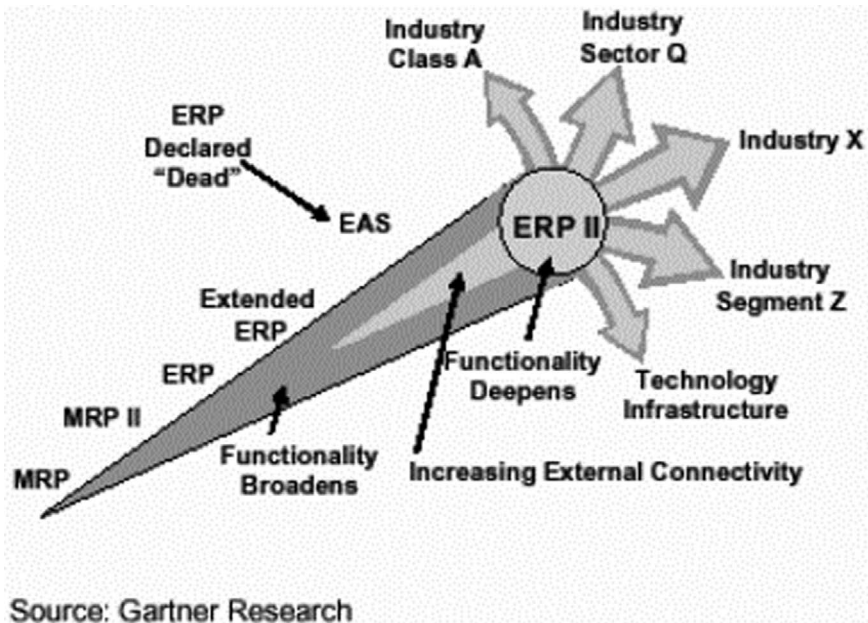


Figure 7.1 ERP versus ERP II (source: Gartner Research)

ERP processes are internal, whereas ERP II is connected to external entities or processes, where it is possible to integrate the enterprise with its supply chain partners. In ERP, data are generated in-house and consumed only by stakeholders within the enterprise, whereas in ERP II data are published and used both internally and externally.

7.3 Functioning of ERP II

ERP II functions by moving across the boundaries of enterprise, given the need for collaboration between different enterprises involved in different business processes, service-oriented-architecture-based systems, improved data exchange methods, and other interfaces. The functions of ERP II are explained using [Figure 7.2](#).



Source: Gartner Research

Figure 7.2 ERP II functionality

The evolution of manufacturing resource planning (MRP) into ERP II is highlighted in Figure 7.2 wherein it is shown that the functionality of MRP deepens and broadens as it moves towards ERP II from MRP. ERP II increases external connectivity. For example, an apparel unit manufacturing shirts for an international retailer can view the material order status by accessing its vendor's system. A single system across enterprises will be followed. So everyone in the supply chain will be connected. Similarly, a vendor can also find out when a material is required by the manufacturer (JIT—just-in-time supply chain technique). The retailer will know the number of shirts produced by the manufacturer by checking in the ERP II system and need not ask for that information from the manufacturer. Once dispatch is made, through point-of-sale data (POS), the manufacturer can know how many shirts have been sold and can also do demand forecasting for the next few months. Thus, ERP II provides value chain improvement and functionality. Visibility is enhanced in operations cutting across the range of enterprises in the value chain, which in turn saves time, cut costs, and augments human efforts made and energy expended to achieve optimum efficiency and profits.

How ERP II functions across different industries is shown in Figure 7.2. It integrates CRM, SCM, and e-procurement systems into ERP. It includes modern quality management tools like JIT, vendor-managed inventory

(VMI), and KANBAN to handle processes efficiently. It facilitates collaboration between all stakeholders in the supply chain, even in areas related to engineering design and development. SAP has implemented ERP II by creating a collaboration network called the SAP community network. In this network, vendors, consultants, customers, and all other stakeholders can share information. It also has “ecohub,” which is the internal implementation of ERP II where more partnerships are formed with vendors. In ecohub, all stakeholders can provide ideas for enhancing SAP’s software offerings. SAP’s ERP II has PLM included in it along with CRM.

ERP II is further getting evolved as ERP III, which centers on customer focus value proposition. It involves customers and market place along with social media. It is the next level of integrating ERP and ERP II functionality to include the customer and the market place. As Bill Wood, SAP business process expert, states in his article, ERP III will create a borderless enterprise through collaboration, social media, and various other ways of data gathering that will integrate market place fans and critics with ERP II. It will lead to more integration between customer and manufacturer thereby aiding in providing better products and services to the customer.

7.4 CRM–ERP integration

ERP and CRM are two most effective management tools used by industries. CRM is a management system used for collecting data related to customers to increase sales, improve customer loyalty, and provide customer delight. ERP and CRM overlap in few places; however, their functionalities are different. As we know, ERP concentrates on integrating all the processes of a company and increasing the visibility in the operations of the company, whereas CRM focuses on managing customers and ensuring that customer data are available for usage when required. Major ERP providers like SAP and Microsoft have created CRM systems also, which are named as SAP CRM and Microsoft Dynamics CRM, respectively. Earlier, ERP and CRM systems were working as stand-alone systems; now they are integrated, which increases visibility in the value chain. For example, SAP’s ERP is integrated with SAP CRM, which consists of modules like SAP CRM sales, marketing, service, analytics, interaction center, and web channel. SAP CRM does the following: partner channel management, investigative case management, social service, loyalty management, real-time offer management, trade promotion management, and mobile solutions.

7.5 Functions of CRM

CRM takes care of sales, marketing, managing orders, and providing support as shown in [Figure 7.3](#). In sales, it helps in assigning leads, converts leads,

and tracks opportunities. In marketing, it supports the following functions: running campaigns, generating leads, and creating a database. It manages a customer order by handling delivering of services or finished products and creating invoices. It provides support in other major areas as well, such as managing customer issues, conducting trainings, providing service, and developing knowledge base. Steve Chipman, a CRM professional at CRM Switch USA, highlights the benefits of integrating ERP with CRM, which are listed as follows:

- An ERP customer record can be created using CRM account record
- Customer financial summary information can be viewed in CRM
- Invoice history and sales order history can be viewed in CRM
- Sales quotes can be given using the CRM system
- RMA (relationship management application) management activities can be carried out using the integrated CRM and ERP

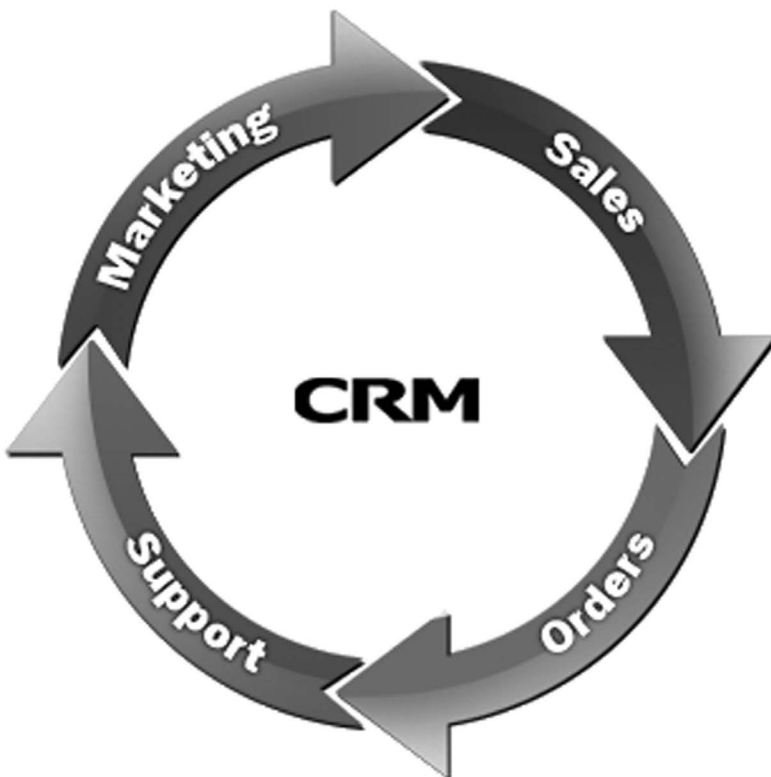


Figure 7.3 CRM functions

Integration of ERP and CRM leads to more sales and reduced expenses. ERP reduces operating expenses, whereas CRM helps in gaining more revenue through better sales by targeting and servicing customers correctly.

7.6 BI–ERP integration

Business intelligence (BI) is a group of tools and techniques used for transforming raw data into usable information for business analysis. BI is built with online analytical processing tool (OLAP). It helps in dashboard management, quick access to reports, and scorecard development. It is used by analysts for making strategic decisions. It is very helpful for senior management to understand the outcomes of business as it analyzes specific data and presents relevant information in a single page if needed to help with arriving quickly at conclusions. A line sketch of how BI helps in data conversion is shown in Figure 7.4.



Figure 7.4 Usage of business intelligence

Raw data are converted into information using data mining. Using BI tools, it leads to innovation and better business performance. The various BI technologies include data mining, process mining, online analytical processing, reporting, complex event processing, business performance management, and predictive and prescriptive analyses as shown in Figure 7.5. ERP is an online transaction processing system (OLTP) used for recording transactions as and when they take place. When ERP is integrated with BI, ERP provides required information for BI tools to analyze information and generate meaningful reports. ERP provides in-depth understanding of operational performance, and BI provides strategic-level insights into business performance. Integration of ERP and BI leads to increased business performance and delivers significant results. Most ERP's are incorporated with BI tools nowadays, as BI plays a key role in management's decision-making. ERP in association with BI can be used for measuring performance, carrying out overall as well as function/domain-specific data analysis, reporting, collaboration, and knowledge management. BI provides dashboard reports as shown in Figure 7.6.



Figure 7.5 Business intelligence technologies

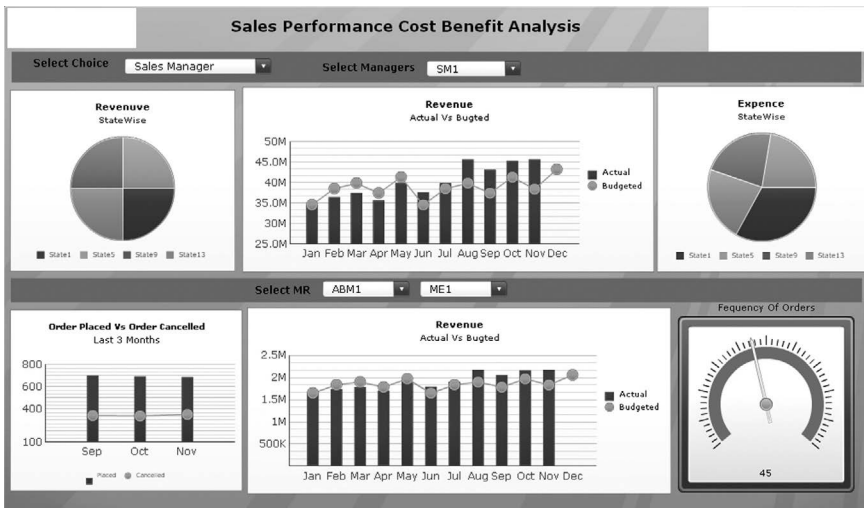


Figure 7.6 Business intelligence dashboard reporting (Source: euthenicsit.com)

Figure 7.6 shows how BI can aid senior management in decision-making. In the sales performance cost-benefit analysis dashboard, detailed information is available on orders placed and cancelled in the previous three months, revenue for the current year and the previous year, frequency of orders, and state-wise revenue, and all these vital information can be easily viewed by a sales manager with the help of BI. BI is used as a means to obtain more value from data available in the ERP. All major ERP providers have integrated BI with ERP for effective decision-making in business. SAP also has a BI platform, and it states that BI helps in obtaining real-time BI from any data, making information usage dynamic and simple, providing benefits through a flexible and scalable information infrastructure, and maximizing user independence by providing data in easily understandable business terms.

7.7 SCM–ERP integration

SCM is the process of managing the flow of funds, information, and material from one party to another in the supply chain at the right time, right place, right quantity, and right quality. SCM's key activity is facilitating partnership between an organization and its customers, suppliers, retailers, distributors, wholesalers, and partners. Integration of ERP with SCM provides for better visibility in the supply chain processes for all stakeholders. ERP has all the information required for smooth functioning of operating entities in the supply chain. Many standalone SCM software systems are available in the market, like Fishbowl Inventory, Freight View, Qstrat QLM Sourcing, Snapfulfil, U Route, and so on, which carry out SCM functions.

The different functions supported by SCM software are given as follows:

- i. Customer order processing
- ii. Vendor management/sourcing
- iii. Inventory management
- iv. Demand management
- v. Transportation management
- vi. Warehouse management
- vii. Distribution management

Figure 7.7 shows the various functions of SCM software, which include logistics, procurement, and supply chain planning (SCP) for delivering products or services at the right time and place. Most ERP software manufacturers have come out with all the modules and functionalities listed previously so that there is no need to constrain themselves with using a SCM standalone system, as the same can be integrated with ERP. This is because ERP will always have all the data required for SCM. The ERP–SCM integration is shown in Figure 7.8. ERP and SCM can work together in the following areas. ERP has demand forecasting, CRM, BI, financials, and HR details available in it, and SCM provides information about supply chain strategy and planning, logistics and distribution, PLM, procurement, and integrated forecast. So when both systems are integrated, it gives advantages of increased visibility in all the activities of supply chain. ERP has become a vital requirement of proper management of supply chain activities. Without ERP, there will be dearth of data for managing supply chain functions. Hence, integration of ERP and SCM will benefit all stakeholders. The standalone software systems available for SCM can be integrated with ERP.



Figure 7.7 Functions of SCM

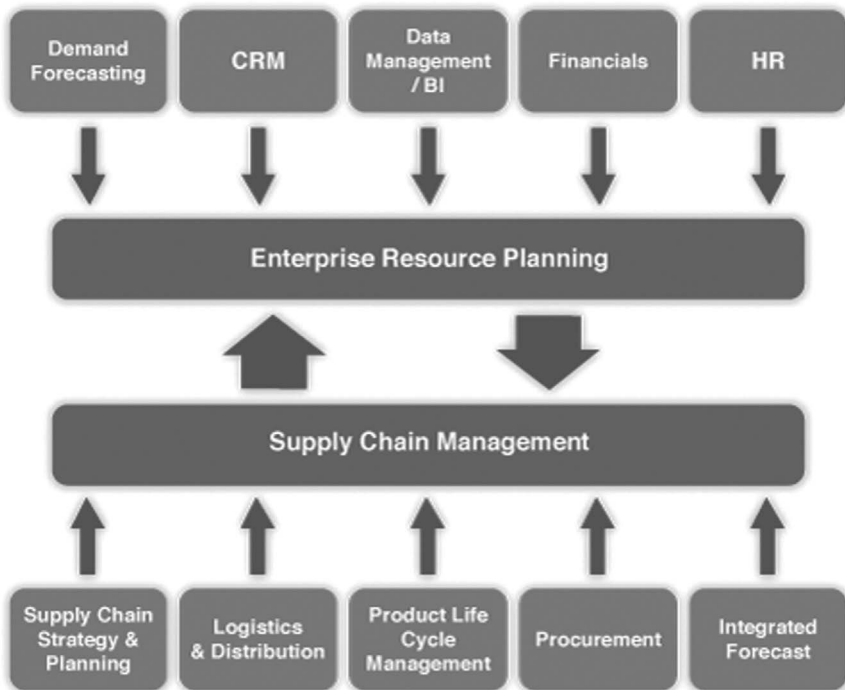


Figure 7.8 SCM–ERP integration (source: mainward.com)

Although there are plenty of vendors that provide SCM-integrated ERP in the marketplace today, there still exist areas like supply chain strategy and planning, where better and stronger integration of SCM with ERP is necessary. SAP has come up with a business suite that incorporates both ERP and SCM, which readily supports customer organizations who need to exercise better control over their business processes via a single-window, that is, an SCM-integrated ERP.

7.8 PLM–ERP integration

According to Margaret Rouse, Technical Writer and Editorial Director of Whatls.com, “Product lifecycle management (PLM) is a systematic approach to managing the series of changes a product goes through, from its design and development to its ultimate retirement or disposal. PLM software can be used to automate the management of product-related data and integrate the data with other business processes.” The design process of a product is managed by PLM, whereas ERP manages manufacturing. Current business scenario and competition necessitate companies to have both ERP and PLM in one platform to innovate and create high-quality products thereby providing customer delight. Tom Shoemaker, vice-president of product

marketing at Parametric Technology Corp., USA, gives an interesting view of ERP and PLM: “PLM is to your intellectual property, what ERP is to your physical property.” PLM software provides centralized data for all activities related to product management and involves phases like product conception, design, realization, and service as a part of PLM. It involves five primary areas: product data management, systems engineering, product and portfolio management, manufacturing process management, and product design.

7.9 Functions of PLM software

Functions of PLM software is shown in Figure 7.9. PLM involves creating product design, configuration, and pricing. Idea management and requirements management are an important function of PLM. Simulation is possible, like checking fit and drape of a garment using software such as Lectra and Bullmer. It also provides product analysis, supports supplier management, and aids in optimizing manufacturing process to achieve better quality. Product and portfolio management is also a part of functions that PLM software can handle. Product service and maintenance can be managed effectively and carried out on time strengthening the organization’s reputation in the market place.



Figure 7.9 PLM software functions (source: palsanjev.com)

7.10 PLM software in textile/apparel sector

Use of PLM software has been in the apparel and textile sector. Wherever innovation is needed, PLM should be used. In that case, fashion and apparel industry requires innovation in each and every activity carried out, and so, PLM plays a major role in these industries. The various PLM software and companies that provide them for textile and apparel industry are given as follows:

- i. SAP PLM, Germany
- ii. Microsoft dynamics PLM, USA
- iii. Infor PLM
- iv. Oracle's Agile PLM, USA
- v. Lectra, France, PLM software
- vi. Plural Technology Software, India (home textile products development)
- vii. Business Management Systems Inc., USA
- viii. Apparel Magic, USA
- ix. Simparel, USA
- x. Bluewater Software, USA
- xi. Centric Software, USA (fashion and footwear industry)
- xii. Gerber Scientific, Yunique PLM, USA

All these PLM software provides various benefits for the textile and apparel sector. PLM software covers various details, ranging from fabric concept to fabric design, trim, and color management. It has a common database containing specifications related to a product, which can be viewed by all the concerned parties or stakeholders. To keep pace with competition, apparel industry requires new designs created every day and thus PLM can immensely help in product development.

7.11 Integration of PLM with ERP

Integrating PLM with ERP will yield a lot of benefits and increase ease of working in a textile/apparel company. [Figure 7.10](#) shows how PLM and ERP can be integrated. The operational functions of ERP are combined with technical functions of PLM to obtain maximum benefit out of both, especially in fashion industry that needs innovation in all its activities. ERP takes care of all functions related to sales, materials management, cost estimating, production planning, control, and dispatch, whereas PLM supports product simulation, purchase, manufacturing, assembly, and quality management. All

the data can be shared across both the systems, which will yield the following benefits:

- New products can be created with ease
- All data can be shared and thus reduce time consumption
- Improves forecasting for upcoming season
- Easy to manage product data and reuse of information is quickly done
- Reduced prototyping costs
- Easier to manage the supply chain process
- Costing is easy as direct integration with product development is possible
- Product quality is improved because of integration

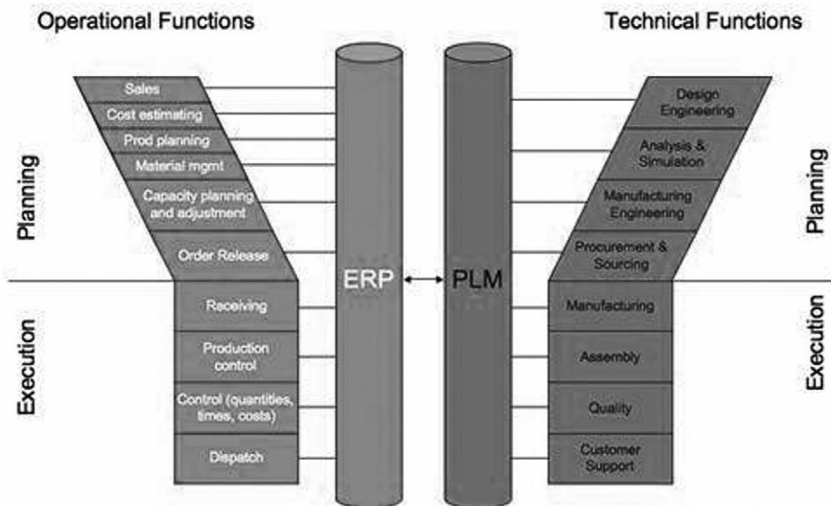


Figure 7.10 ERP–PLM integration (source:bloorresearch.com)

Integration of PLM with ERP is a welcome step, as there are requirements for creating up to 10 collections in a year for fashion industry; to cater to such a demand, fast-paced developmental activities aided by integrated software are the need of the hour as it is crucial to reduce product rework time.

7.12 Machine integration

ERP is being integrated with all other functions like CRM, SCM, BI, and PLM. Apart from these, to make ERP a more efficient and able decision-making tool, integrating machines and thus their operations with ERP system is also being

carried out. It is the process of directly capturing the operational data from a machine(s) by linking the machine to the ERP system, which will avoid manual entry of machine data and errors in data. This integration is widely used, as it reduces manual errors made during data entry. It reduces time taken for making data entries. Real-time data will be available for all stakeholders. Integration of all machines can be done with ERP. The various areas where machines are integrated with ERP in a textile/apparel industry are given as follows:

- Production data and end-breakage data from ring frame in spinning department can be transferred to ERP directly.
- Weaving production can be transferred directly to ERP.
- Testing instruments are connected to ERP so that data get transferred automatically to ERP once tests are done.
- Defects and production data from cone winding machine can also be transferred directly to ERP, thereby providing an option for customers to log into the ERP system and check the quality of the product to be delivered to them. A diagrammatic representation of how customer gets information is shown in Figure 7.11.
- Sewing production output can be tracked in ERP automatically when the sewer passes material from one machine to the next.
- Work-in-process (WIP) data can be immediately obtained due to machine integration.
- Number of finished pieces in the sewing department can be found out immediately.
- All defects in weaving when detected during quality check can be automatically transferred to ERP from the systems used for checking weaving quality.

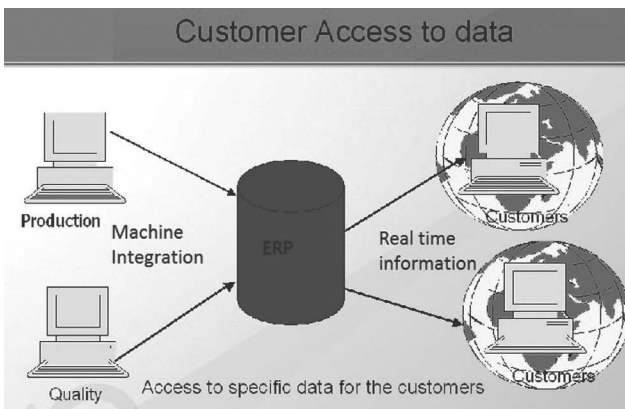


Figure 7.11 Real-time information to customer through machine integration with ERP

Machine integration with ERP helps in immediate decision-making for a manager. For example, if the manager has gone abroad and wants to monitor ring frame production, he can log into the ERP system and find out the last hour production or any data he wants for production already made. If he finds that production is lower over the past few hours, he can immediately contact personnel reporting to him to ensure that production target is met. He need not wait till the next day for report via email stating that production target has not been met. It enables him to take action immediately rather than waiting.

Similarly, a customer can find out yarn quality or quality of fabric or garment to be delivered to him by logging into the ERP system. If customer finds quality not up to standards, he can immediately resolve the issue by talking to concerned personnel rather than waiting for material to reach his premises and then check and find out that the material delivered is of poor quality. Thus, ascertaining quality level before material dispatch by using ERP saves time and money for the customer as well as the supplier because necessary control measures can be carried out to correct errors and avoid unnecessary rework time and costs once material is returned by the customer. In addition, test results from any testing instrument can be immediately known using machine integration facility. If $U\%$ is high for a yarn taken from a particular ring frame, it can be immediately detected by ERP and notification can be sent to customer through e-mail or sms or pop-up on screen. In ERP, the permissible values for each parameter can be fixed, such as maximum and minimum values for $U\%$, imperfections, and so on, and once a result comes with deviations below or above the limit, a notification will be received by the concerned person. Such facilities provide great advantage for middle-level and senior-level management personnel, as they increase visibility in all processes, saving time and money.

An example of machine integration is shown in [Figure 7.12](#). Premier Evolvics Pvt. Ltd., India, is a pioneer in developing an ERP system that provides complete online data acquisition. They provide an ERP software named Texpert that exclusively caters to the spinning industry. How machinery is integrated with Texpert is discussed here as an example. [Figure 7.12](#) shows how Texpert is integrated totally with all the machines. Data from all the spinning machines along with results from testing instruments are directly captured by the ERP system. Individual spindle monitoring system called Ring Data and presently Ultimo are used to detect end-breakage in the spindle along with production output of the machine. The data captured are transferred to a software named Milli, which calculates production output details of each spindle and spinning machine. It provides production reports with dashboards and notifications when deviation is found. Milli can also function as a standalone system. This system is integrated with Texpert, and data are transferred to the ERP system, enabling all stakeholders to view in real time a variety of information related to production and stoppages.

Similarly, Texpert provides an automatic data transfer system used for quality management, where test results from each instrument are directly fed into the ERP system through a software program. This results thus fed into the system are analyzed to check for deviations from standards set for product quality, and any deviation found is reported/notified to the concerned person immediately through means such as mail, sms, popup, and so on. This process is shown in Figure 7.12. All major ERP providers, including SAP, have come up with machine integration features to give real-time information to customers.

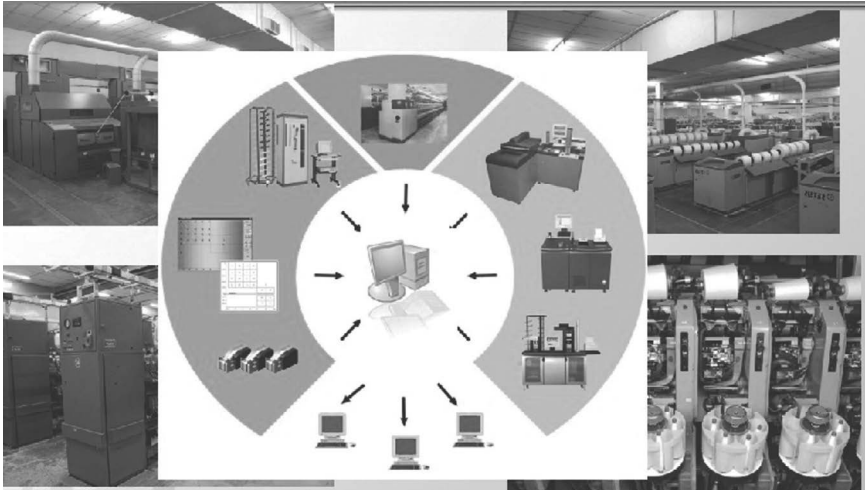


Figure 7.12 Machine integration with ERP systems (source:premier-1.com)

7.13 Reporting tools

A major development has come up in the area of creating various reports in ERP. Customized reports can be generated and clients are provided with better access to relevant information. A variety of free ERP report creation software, such as Jasperreports and Pentaho, are available in the market. Clients can use these to configure their own reports. Commercial software are also available, such as crystal, Oracle Reports, Style Reports, and so on, which can be used for software configuration.

Some of the various types of reports possible to prepare in ERP were discussed in the previous chapter. The latest developments in this scenario include getting reports in Acrobat .pdf or Microsoft Excel formats in addition to html format that is routinely used for presenting reports. The latest reporting tools can provide the following benefits:

- Easy to use, and simple codes are enough to create a report.
- Dynamic report design—any logic can be incorporated into the reports.

- Inherited report design—dynamic reports can be created, and there is no standard static design that has to be followed.
- Limited knowledge on creating reports—even textile/apparel technologists can create customized reports using latest reporting tools, as there is no need for greater knowledge on coding and programming.
- Static and dynamic reports can be obtained at ease.
- Reports can be generated very quickly as compared to legacy systems, which took a lot of time to generate reports because of their inability to manage huge volumes of data.
- Reports contain graphics and present data in a manner that is visually appealing and easy to comprehend for the user.
- Reports also magnify deviations clearly, and there is no need for searching details in the report to identify deviations.

ERP's success is due to the variety of reports that can be obtained, and now with BI integration, even more number of different types of analytics reports can be obtained using ERP.

7.14 Cloud ERP

Usage of cloud computing in ERP is a significant development that has taken place. Cloud computing is the process of using a network of remote servers hosted on the internet to store, manage, and process data rather than using a local server or a personal computer. Data are stored in different locations and are accessed through internet. The word “cloud” refers to internet, and so it is nothing but internet-based computing. A simple example of cloud is Gmail or any e-mail service provided to public. In the case of Gmail, we can access our mails stored in servers at remote locations. Gmail manages our data, and with proper identification, we can retrieve our data anytime we need. Few types of cloud in existence today are as follows:

- Private cloud
- Public cloud
- Managed cloud

Public cloud is a type of cloud in which services and resources such as applications and storage are available to general public over the internet. Gmail is an example for public cloud where anyone can access data with a user name and password, whereas private cloud is one in which only stakeholders have access to the server and information stored. An example for private cloud is the ERP system, where only people related to a particular company will access the ERP system put in place by that company. It is managed by the IT

department of that particular company. Managed cloud is the type of cloud where server, infrastructure, and software are managed by a third-party, a trusted vendor with relevant expertise to provide services in the category of managed cloud computing. It is an advantage to textile/apparel companies because they can concentrate on core processes rather than taking care of IT activities of the company in which they are not specialized.

Figure 7.13 gives a schematic diagram of how cloud computing works. The data center can be located at any remote location. The company's users access data through cloud and required information is received by them. There is control and application delivery network available to ensure that required information is obtained by the user. Similarly clients, on-site employees and partners can access the system through cloud. Cloud ERP is an advancement in the existing ERP systems, where cloud computing is used for providing access to ERP systems over internet. This gives more flexibility to a business as real-time information can be obtained over the internet with servers located remotely. These servers need not be managed by the textile/apparel company and can be managed by a service provider.

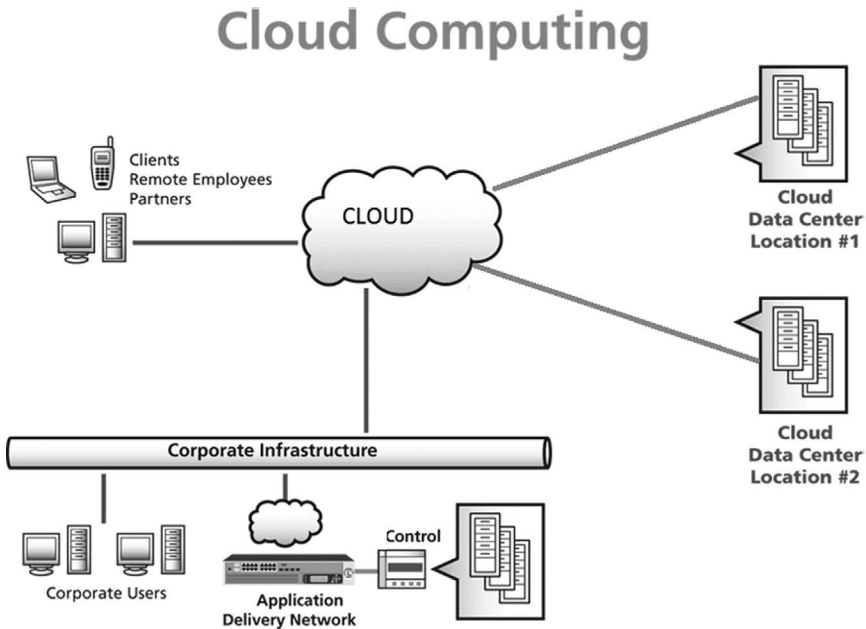


Figure 7.13 Working of cloud computing

7.15 Benefits of cloud ERP

Cloud ERP has more benefits than an on-premise ERP does and as shown in [Figure 7.14](#)

- Data storage is secure.
- System can be put to active use very quickly, in weeks rather than waiting for months to complete implementation, which is the case with on-premise ERP.
- More options are available for scaling system usage, which can be utilized by including new applications, and users can pay based on usage made rather than buying the whole software, which warrants investing huge sums of money.
- Total cost of ownership is reduced; hence, a quick return on investment is possible.
- Investing in hiring a dedicated team of IT personnel to manage the ERP system is not needed, as data transaction is cloud-based and handled by service providers.
- Cloud ERP saves money and time, increases efficiency, and facilitates innovation. It also gives lot of flexibility in the usage of systems. Overall it leads to increased efficiency in ERP usage.

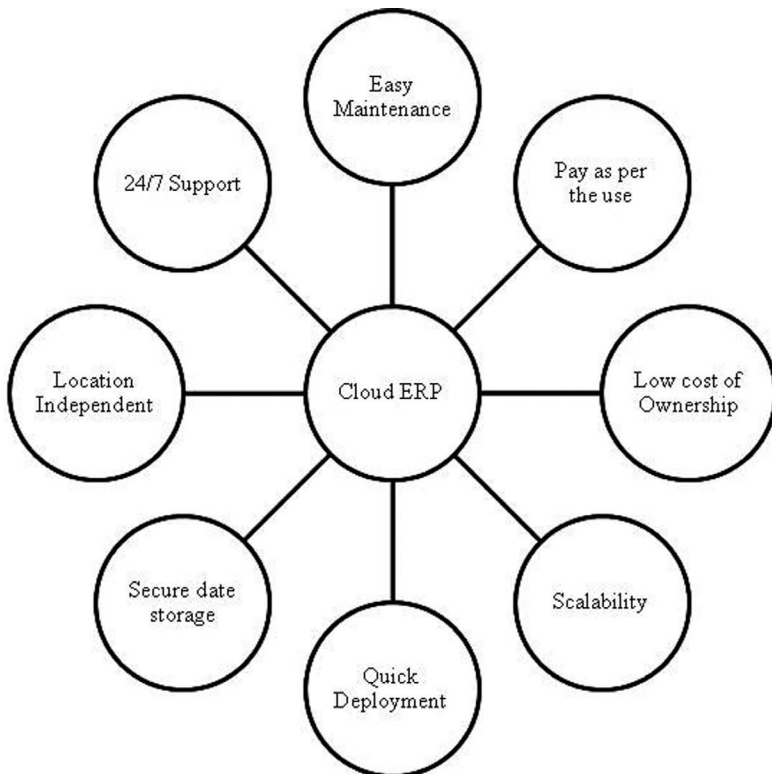


Figure 7.14 Cloud ERP benefits

7.16 Cloud ERP service models

There are three types of service models in cloud computing:

- Software as a service (SaaS)
- Platform as a service (PaaS)
- Infrastructure as a service (IaaS)

These models come into play if companies use “managed cloud,” instead of private or public cloud, where their vendors manage IT activities. Figure 7.14 shows service models or layers of cloud computing. Clients can use their web browsers to access a software or an application or can use the platform or infrastructure managed by a third-party vendor. Three ways of client computing usage are shown in Figure 7.15. To better understand the different service models in use, see Figure 7.16.

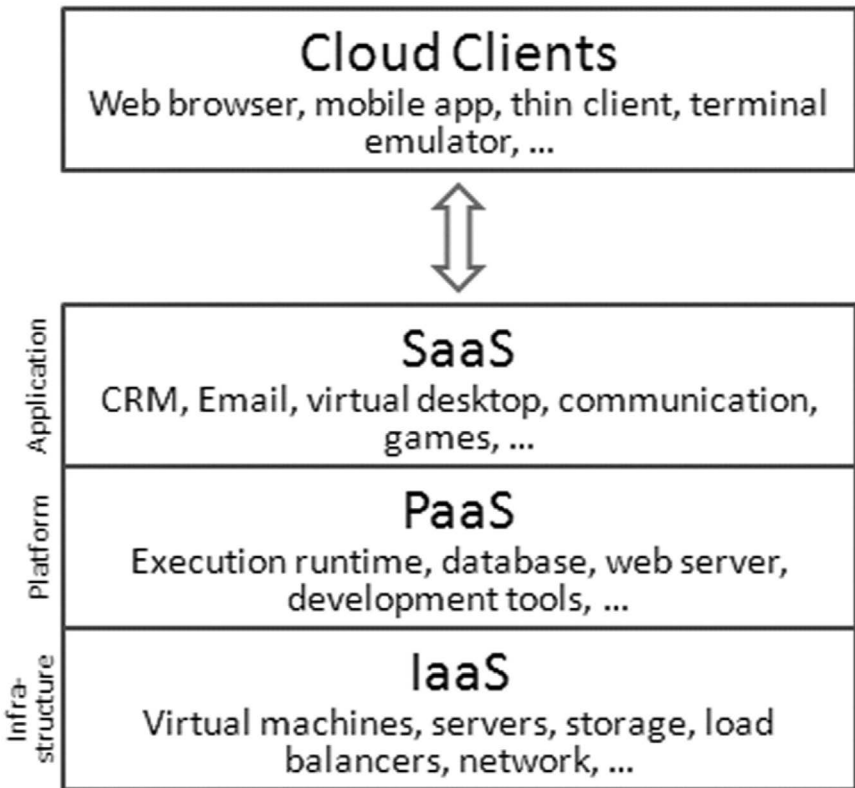


Figure 7.15 Service Models of Cloud (Source: Wikipedia.org)

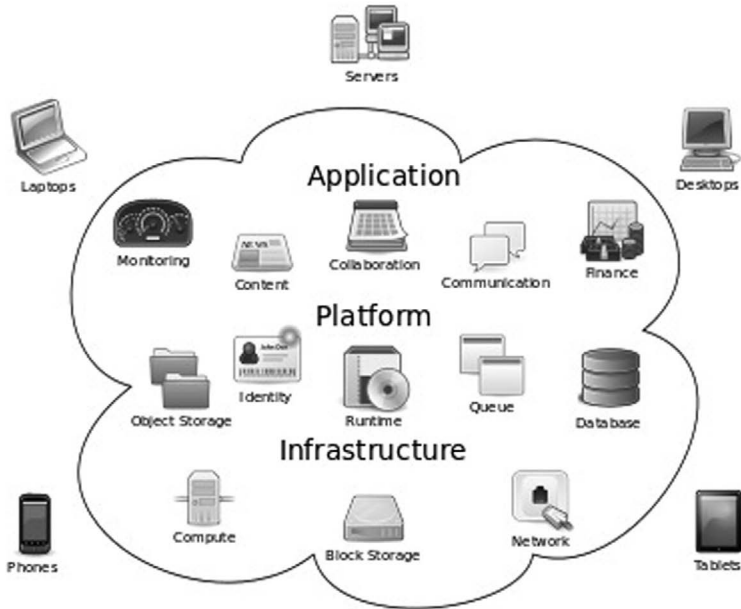


Figure 7.16 Cloud computing models (Source: Wikipedia.org)

Software or applications typically available on cloud are shown in [Figure 7.15](#), which are managed by a vendor. In cloud, textile/apparel companies can opt for two types of services: (i) vendor manages the platform for the company, and (ii) the infrastructure itself is provided by the vendor, which will result in reduced ownership costs. All major ERP providers like SAP, Oracle, Microsoft, Datatex, Ramco, and so on provide ERP on cloud.

7.16.1 Software as a service (SaaS)

In the research report of Price Waterhouse Coopers' (PWC), a multinational professional services network, it has been projected that in 2016 investment in SaaS ERP solutions will touch US\$78 billion compared to US\$15 billion invested in traditional ERP systems across the world. In this model, ERP application is hosted by a vendor at a remote location. This vendor manages the application and hosts the server. Users at the customer's end can connect to the cloud through web browser or mobile and access the software. The customer pays for the service and so initially they can use the most relevant features of the software and then expand the scope and variety of services if they are encouraged by the benefits of using it. Services can be paid for on per-use basis. The textile/apparel company can pay subscription charges to the vendor for using the software. Data will be managed and protected

by the vendor and agreements will be signed between the vendor and the client to ensure data confidentiality. It may not be useful in cases where the response time between the client systems and the cloud needs to be within milliseconds or otherwise SaaS model can be used extensively. Many textile/apparel companies have started using SaaS model ERP, as the total cost of ownership reduces since there is no need to invest in building IT infrastructure and hiring technicians to maintain it.

7.16.2 Platform as a service (PaaS)

In this case, platform is provided by the cloud vendor; this includes operating systems, programming language execution environment, database, and web server. This can be used by textile/apparel companies that would like to build in-house ERP with minimum capital investment. They can use the platform provided by the vendor to develop and run their software solutions and need not spend on buying and managing the hardware and software required for using the software solutions developed in-house.

7.16.3 Infrastructure as a service (IaaS)

IaaS is a service where the entire infrastructure, starting from physical computers to dedicated IT professionals, are provided by the vendor. The vendor provides servers, IP addresses, firewalls, and so on for the customer. This model is not used widely in companies using ERP, and it is mainly used by startup companies where there is a need for more hardware and software to run their businesses; hence, textile/apparel companies do not generally use it.

Cloud ERP, especially the SaaS ERP, is creating a huge impact on the traditional ERP systems and its market is expected to grow at a faster pace in the coming years, considering its ease of use it provides in managing the ERP.

7.17 Mobile ERP

The next big thing in the ERP sector is developing ERP solutions that can be used in smartphones and tablets. Many ERP vendors like SAP, Oracle, and Epicor have come out with mobile ERP applications to cater to business needs. Mobile ERP is a suite of integrated applications catering to the needs of mobile users. Enterprise data can be accessed from anywhere using a mobile phone application. It will be very useful for marketing and sales people as they are on travel most of the times and need to access customer data quickly.

7.18 Future developments

Other developments foreseen in ERP include the following:

- Data analytics will become a major area of interest in ERP. Usage of ERP has given rise to huge accumulation of data that will be used in the future for more analysis. For example, retail analytics is an area that will form part of ERP in future.
- Context-based information will be provided to ERP users. Based on the work to be carried out, users can get up-to-date information on relevant areas automatically when they need it. For example, when a business development manager goes to meet a client, he will go fully prepared, with vital information such as client relationship history, detailed customer profiling, and business achieved till the date of the meeting, and so on.
- Wearable technology will become a part of ERP. Smartwatches and glasses can be used to capture information and transfer it to the ERP system automatically, thereby reducing the work of the data entry operator.
- The internet of things (IoT) concept would save lot of human effort in the future. It is also known as machine-to-machine (M2M). It is a new technology where intelligence is incorporated into machines thereby enabling machines to connect over the internet. For example, a production manager will be told by the computer that he has to increase the speed of a spinning machine immediately for the next 2 hours to achieve the desired level of production. This type of technology will lead to greater innovations and increase operational efficiency.
- SaaS model would be followed by most of the industries, thereby reducing the usage of traditional ERP systems.
- More advanced software and data compression techniques will come into place, making applications run faster and deliver reports at express pace.
- Decision-making capabilities of managers will improve with more meaningful reports generated from ERP using the data available in the system.
- ERP will try to become the sole software used in the organization, eclipsing all the other standalone systems used in the company for processes such as SCM, PLM, CRM, and so on.

Summary

In this chapter, the latest developments in ERP are discussed in great detail with examples. The terms ERP II and ERP III are explained. Integration of ERP with BI, CRM, SCM, and PLM is discussed and explained with clear illustrations. How key applications such as CRM, BI, SCM, and PLM are integrated with ERP and work within the ERP platform are also discussed. How machine data integrated with ERP can be used to obtain real-time information on specific machine's performance is also explained in this chapter. New reporting tools available for easy reporting are also discussed. The cloud computing concept, along with its functions and different service models such as SaaS, PaaS, and IaaS, is also briefly discussed. The latest developments in the area of mobile ERP is also brought to light along with developments and technology advancements foreseen in the field of ERP, including big data analytics and introducing concepts like IoT and wearable technology into ERP.

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In this chapter, case studies are provided to understand how ERP is implemented in textile/apparel industries. The benefits these companies derive from using ERP are discussed. Various success stories of implementing ERP are discussed through case studies presented in the chapter. Areas possibly needing improvement in ERP during its implementation and active usage are also discussed with the help of case studies.

Keywords: ERP risks, ERP success, ERP failures, ERP benefits

8.1 Introduction

Case studies provided in this chapter are taken from various online sources, including vendors' websites, customers' websites, and author's personal experiences in implementation. Case studies are given for to better understand ERP; hence, they may not give full details about ERP implementation and benefits mentioned in those cases. Therefore, if the reader wants to know further details about cases presented here, he or she can refer to the source websites.

8.2 Success stories

8.2.1 Industry-specific ERP for integrated textile manufacturer

Customer challenge

A leading Indian textile and apparel manufacturer with a business of worth US\$800 million has 20 manufacturing locations in India. They are the largest denim manufacturer in India and globally the fourth largest producer and exporter of denim. Their products range from denim, shirting, knit to voile fabric, jeans, and shirts. They had a generic ERP solution that was not able to effectively handle the increasingly complex business scenario in their industry. There was a need to change the ERP vendor who catered more proficiently to the changing needs and complex requirements of textile Industry.

Solution

Datatex NOW ERP solution, which has been implemented in many flourishing textile companies to handle their business better, was chosen along with "Infinite," their implementation partner. Infinite Computer Solutions is an international IT company with expertise in Platformisation™ IT solutions

and frameworks, product engineering, and enterprise mobility solutions. Domain experts from Infinite started the business process reengineering (BPR) phase and restructured the top 20% of the processes. The BPR process they reconfigured and finalized was called “BPR-on-fly,” which essentially set the platform ready for implementing Datatex NOW. The software was implemented in the following areas: garment and fabric sales, purchase, warehouse, costing, planning, production, and quality. Difficulties in implementation included implementing the platform in dual locations. It was handled by a dedicated core team of subject-matter experts and a technical team from Infinite. The ERP system became ready to run after a period of 16 months.

Outcome

The ERP platform went live, including all their businesses and locations on the same day it went live, which means it was not implemented in piecemeal fashion and signified successful implementation. Enabling the entire organization to go live on same day instead of phased roll-out ensured that all the stakeholders were getting information at the same time by using ERP instead of waiting for their turn. The commercial processes of the company were able to meet the needs of its sales force, and planning became more streamlined. SAP’s finance module was used, and there was seamless and real-time integration between SAP and Datatex NOW ERP.

Findings

The above case study shows that industry-specific ERP solutions can help companies run better. In this case, Datatex NOW is an ERP focusing exclusively on textile/apparel industry; thus, by implementing it, the manufacturer achieved better results in planning and sales within a short period.

8.2.2 Managing and planning resources from a single, easy to use location

Customer challenge

A large textile company with different locations did not have a central storage area for storing key information. Due to difficulties in getting the right information when needed led to slower decision-making. They were not able to track past records and provide accurate cost estimates to customers as they did not have an organized database. They were not able to properly maintain data on production, material usage, stock management, and waste accounting, which in turn led to excess and wasteful use of resources and time. What they needed was a system to keep information in an organized manner and retrieve it when needed. The client specifically had problems tracking material wastage.

Solution

AllianceTek's ERP was chosen by the client to track all data related to key information and access them from a single location. AllianceTek has a dynamic custom ERP solution that manages the entire business process from a single web-based point. Their ERP system had the capability to track material wastage once a work order was processed. AllianceTek provided dynamic modules with ERP, such as dashboards, data analysis, and reporting, and they were able to present key information to senior management when required, thereby making it possible to oversee and manage from a single location all processes taking place in multiple locations. This ERP system provided an option that sent alerts when material needs to be reordered and maintained full record of stock available.

Outcome

The company management was able to obtain key information from multiple sites at a single location thereby reducing time and resources spent for obtaining it. It resulted in better management and a higher return on investment (ROI) for the company. Since information is available at all times, it equipped senior management to take business and administrative decisions easily and provide quicker and accurate cost estimates to customers leading to customer satisfaction. Company was able to track material wastage and key performance indicators (KPI) using dashboards and reports.

Findings

In this case, the customer looked for a system that can provide key information and track data related to all operations and processes taking place at multiple locations. AllianceTek ERP software tracked key information and helped to manage and plan resources from a single location. ERP systems help in management decision-making and efficiently managing all the organizational resources.

8.2.3 Rise in profits and reduction in chargebacks using ERP

Customer challenge

McCubbin Hosiery of Australia is a leading manufacturer, importer, and distributor of hosiery products like socks. It had an impressive list of customers, like Sears, Nordstrom, Kohls, and others. Its manual processes and high chargeback volume reduced operational profits and led to poor customer service and customer dissatisfaction. Chargeback is the amount reduced by retailers while making payment after making deductions in the invoice amount to compensate for mispicks and shortages.

Solution

Apprise ERP solution was implemented in the company. It had all the modules needed to manufacture, import, and source products and to distribute material to companies like Walmart. Apprise's wireless warehouse technology enabled the company to automate receiving, picking, and counting to eliminate errors in mispicks and shortages. The workflow options available in this software enabled the operations to break down larger pre-pack inventory into smaller lots that can be resized, tagged, and sent to retailers as required.

Outcome

McCubbin's private lines efficiency increased. The chargeback on mispicks reduced by more than 92% and on material shortage it reduced by 80%. Kohl's chargeback reduced by 95%, and projections indicated that a 20% increase in sales volume was possible without increasing labor. A 22% increase in revenue was noticed because of ERP implementation even during recession. Automatic tracking of cost/value of labor, product pricing, profit margins became possible for each of the private lines.

Findings

ERP provides more visibility and instant availability of all the important metrics required for taking decisions. It helps apparel retailers to increase their revenue and also reduce chargebacks by tracking the work-in-process (WIP) correctly and reporting any deviations immediately.

8.2.4 Improved visibility through ERP differentiates award-winning brand

Customer challenge

Allure Bridals is an international distributor of bridal, bridesmaid, and prom gowns. They are recognized for their fashion-forward design and silhouettes. They were recipients of the coveted Desert Rose Award in 2005, 2006, and 2007, which is the highest honor in bridal costume industry. Their sales and revenue was growing at a rate of 25% to 30% annually and they needed an industry-specific solution for apparel distribution to take care of their global growth initiatives. Their retailers needed to access critical inventory information during evening and weekend business hours. Hence, they needed more visibility in the supply chain for retailers to get data about quantity available for purchase. They also wanted to improve order accuracy and shipping efficiency.

Solution

Allure Bridals went for an industry-specific solution, Apprise Software, to take care of their global growth drives and the need to increase their visibility.

Early discussion meant that the company looked for robust customer portal capabilities that would allow marketing executives and customers to readily see their inventory so that orders could be placed quickly. Their lead times were three to four months, and the company felt that a provision for customers to take a look at the orders in production would be very useful for them to plan their purchase in advance and quantities required more efficiently. Apprise Software was able to provide the required information and comprehensive inventory and production reports.

Outcomes

A better visibility of sales trend became possible. Stakeholders were able to get inventory information when required. Order accuracy improved to a greater extent, and shipping efficiency increased. They had an integrated process in place to communicate special order requirements. This new process proved to be 100% effective. Third-party integration with Federal Express was also possible, which improved shipping efficiency. All these factors increased their potential for global growth.

Findings

The ERP software was able to support the company's global growth initiatives. It could cater to company's need to enhance operational visibility for customers as well as for management decision-making by providing detailed reports on inventory and production. ERP software has to be open to integration with third-party service providers, and in this case, they were able to link ERP with Federal Express to take care of shipping needs.

8.2.5 Handling retail business requirements through HCM

Customer challenge

A fast-growing apparel company and a premium lifestyle player of retail sector in India that had achieved market leadership wanted to go for international labels enabling Indian consumers to buy most prestigious global fashion wear and wanted to maintain its market leadership. Constant efforts are required to maintain market leadership. To sustain its leadership position, company wanted to streamline its recruitment process, employee training, and logistical processes. The existing legacy system was not addressing their retail business requirements. It was inflexible and could not be modified to accommodate features required to meet new business needs and as a result, customization, even if it was possible, was not cost-effective. There was another challenge as well, that is, talent management, as different brands have different business rules in talent management.

Solution

Ramco's HCM (Human Capital Management) software was chosen; it has flexibility and facilitates easy handling and detailed interpolation of data on human resources. Ramco HCM has retail-specific recruitment solutions to address corporate initiatives. It has features that perform monthly performance appraisals of employees, which can be consolidated into annual appraisal reports, and help in workforce planning to plan personnel requirement to suit outlets that sold specific brands. Thus, Ramco HCM was implemented by the retailer.

Outcome

It led to better planning and smooth execution of recruitment processes. It reduced recruitment costs incurred for acquiring the best personnel eligible for the job. It enabled automation of performance management and assessment processes. It aided in managing and developing the talent pool through proactive suggestions such as conducting training programs to enhance employee productivity and efficiency. It led to comprehensive talent management and handled shortcomings in the legacy system and helped the company to retain its market leadership.

Findings

A comprehensive HCM has helped the company to manage their employees' performance and recruitment to a great extent. The retail business requirements could be handled better and as a result the company could maintain its market leadership. HCM is a standalone system. Imagine the potential of Ramco's ERP in this case, if just an HCM software module alone could create such a big impact on customer's growth, implementing Ramco's ERP could have led to much greater growth in business. If this HCM module were integrated with a complete ERP package, the benefits would have been enormous.

8.2.6 New business requirements require more modern and fully equipped systems

Customer challenge

One of the largest yarn manufacturers in India having fabric and garment operations and earning a group revenue of more than US\$1 billion wanted to keep pace with changing business requirements. They have more than 30 production facilities across India. They wanted to implement an ERP system that is more current and suitable to their business needs for their textiles units and steel units.

Solution

Infinite Computer Solutions came up with an option of implementing Datatex NOW ERP to handle both the textile division and the steel division. It had all the required modules to cater to sales, purchase, warehousing, costing, planning, production, quality, and HR payroll and was fully equipped to manage the latest challenges and requirements in a dynamic industry. The challenges faced in implementing the software over multiple locations were overcome by the Infinite's team of domain experts.

Outcomes

All the textile units went live via ERP on the same day followed by steel units. Planning processes became more streamlined. All their commercial processes were now able to manage sales needs in a better way. Inter-unit transactions were made in line with the needs of the organization. Business challenges were taken care by the state-of-the-art, fully equipped ERP system.

Findings

Companies have started to look out for complete and best-in-class ERP packages customized to suit their needs and deploy best business practices in their operations in order to become more profitable. More current ERP systems with deep domain knowledge are chosen over diversified ERPs. More recently, industry-specific ERPs are trying to gain a greater foothold.

8.2.7 ERP for scalability of operations

Customer challenge

A leading apparel manufacturer in India was faced with severe limitations and challenges in scaling up production facilities to meet with growing business demands. They expanded their facilities to specifically attract customers who could give large orders. They were not able to manage the orders received due to operations taking place in multiple facilities. Department-wise standalone systems like stores management and accounts management could not cater to the needs of growing business and led to poor control over business. The company was unable to manage its large workforce and design an appropriate supply chain, and all this had affected their profitability.

Solution

Exilant Technology's Seamless ERP was chosen to deal with the complexities of managing expansion and gaining better control over business. Seamless ERP is a breakthrough product suite that takes into account the industry volatility to help apparel manufacturers sharpen their competitiveness even

during turbulent times of business. The software had all the required modules to manage the business, workforce involved, and also the scaling issue faced by the company in this case.

Outcomes

The company was able to more ably manage its expansion. More visibility could be created in its supply chain. It could manage large orders without any difficulty by making decisions based on data received through the various reports generated from the ERP software and was able to handle customer requirements on time. Better control over operations became possible with effective production planning and management. The need for an organization-wide information management system taking care of expansion was fulfilled through ERP implementation.

Findings

ERP software is very useful to handle business conducted in multiple locations. It gives real-time details to everyone involved in the supply chain. It helps in gaining better control over operations. It supports company's efforts to grow and expand its business.

8.2.8 ERP solution along with shop floor automation

Customer challenge

A leading Sri Lanka-based apparel manufacturer that catered to a niche segment of infant wear manufactured over 5 million garments in a month. They were dealing with baby wears and were faced with business complexities in fabric purchase. Their shop floor needed to be automated to deal with day-to-day operational and business requirements.

Solution

DatateX CAMS, a useful shop floor automation tool, was chosen along with DatateX NOW to take care of their apparel company needs. CAMS is a middleware that enables users to record shop floor activities, including for sewing and cutting. Implementation was done at multiple locations using the domain experts of Infinite Computer Solutions.

Outcomes

The successful unit-wise roll-out created a great impact on all the business units of the organization. Shop floor automation helped in recording all the shop floor activities, enabling better control over operations. Production and quality processes showed significant improvement after implementation.

Management of day-to-day operational activities became more effective and thus operations became more efficient.

Findings

Shop floor automation is handled by an additional tool along with the ERP software. This tool is integrated with all the modules of ERP to transfer data across different modules and made it possible for all stakeholders to view relevant data when required. ERP vendors provide a lot of allied products along with the ERP software, and clients can choose one from the range of packages offered that best suits their needs and helps them to manage their business more efficiently and effectively. These products are available for different purposes; they can be a shop floor automation tool as in this case or a planning tool that enables production planning in an apparel company, spinning industry, or weaving industry. They can be an automatic dye dispenser unit integration tool in the case of a processing industry. Clients should utilize the benefit of such allied products to better manage their business and increase profits.

8.2.9 ERP for dynamic market conditions

Customer challenge

A world-class Indian fashion retailer with international presence found itself unable to manage rapidly changing customer needs, decreased product lifecycle, and lower profits. There were uncertainties in the global market, and timing the launch of new products in the market was a big issue. The retailer had very good infrastructure but lacked proper systems to recognize market needs. The retailer was looking for a system that could help them gain a better understanding of customer requirements and market needs.

Solution

The retailer implemented the ERP software from a leading vendor to take care of the issue. The ERP software purchased had an integrated customer relationship management (CRM) module to take care of the market-timing issue in relation to launching new products. With the ERP software, the retailer was better positioned to compete in the global market as they had the required information when needed. It was easier for the retailer to take decisions.

Outcomes

The CRM module helped the retailer to record customer data and analyze patterns of customer requirement and get market analytics reports to accurately gauge market needs. It made information readily available at all times and thus helped in reducing operational costs, providing on-time delivery, and making faster decisions regarding launching new products.

Findings

ERP systems help in timely decision-making that benefits business. It takes care of complexities in business, and its integration with CRM helps in managing customer requirements more effectively. Analytics reports obtained from an ERP integrated with BI led to providing accurate information for senior management's use and thus to effective decision-making.

8.2.10 ERP for a composite textile manufacturer

Customer challenge

A leading textile manufacturer having composite units at multiple locations faced the problem of getting integrated information. They were into weaving, processing, and garmenting. The company was looking at a single ERP system that can cater to all its business verticals in the textile and apparel industry. Stock from its weaving unit was sent to processing unit, and after processing, stock was sent to garment unit for apparel manufacture. Apart from this, each unit sold their output directly to customers instead of sending it to the next unit for further process. (e.g., weaving unit sold their greige [unfinished woven or knitted] fabric directly to the customers, whenever there was an order and also supplied the fabric to the processing unit when needed). All these units had outsourced their operation when there were huge orders. It was difficult to manage production, stock, and dispatch of finished products to all the required units. It was difficult for head office to have different systems at different locations and getting the required information proved a herculean task.

Solution

The company decided to go for Exilant's WeaveIT and Seamless ERP that cater to textile and apparel business, respectively. WeaveIT is a state-of-the-art ERP software catering to textile verticals, and seamless ERP takes care of requirements of apparel business. The company implemented ERP in all their units and that gave an impetus to its growth. As a result, data were centralized. Order flow was streamlined. Company was able to take decisions on time and gather required information on time. Data from all units became available via WeaveIT, which was integrated with Seamless. Hence, apparel users were able to login to this seamlessly combined systems and find out WIP values to plan production accordingly.

Outcomes

Using a single integrated ERP system across all the units led to proper utilization of resources. It was easy for the head office team to find out stock availability. Managing the stock became quite simple as all units had

access to current WIP details. Job order and subcontract were executed easily using POs available in ERP. Order management became easy. It was easy to manage finished products and manage demand for output across all units. Stock transfer between different units also became possible.

Findings

Integrated ERP for a composite unit is the need of the hour. Organizations look at a single ERP system catering to all their business units and verticals so that information sharing becomes easier. Supply chain management (SCM) will become easy with an integrated ERP. An integrated ERP provides more flexibility in business activities.

8.2.11 Integrated information for quick release of POs

Customer challenge

A leading Indian apparel company with an annual sales of more than US\$11 billion and a yearly growth rate of 30% faced the challenge of integrating information from various departments and increasing the number of purchase orders (POs). It took 22 days for the company to release a PO and the proportion of unutilized stock they had was up to 30%. Only 70% of POs were released on time.

Solution

SAP R/3 + AFS ERP, SAP APO, and SAP BW software was implemented using SAP's consultants. ERP software helped in improving the number of POs released and integrating information across all departments.

Outcomes

Proportion of POs released on time went to 90%, which was way better than the 70% PO release rate that prevailed prior to implementing ERP. It reduced the time taken to release POs by four days. Proportion of unutilized stock went down to 10%, thereby reducing the liability created on account of excess stock. Order-processing time was also reduced substantially since information from the required departments was available on time.

Findings

ERP increases efficiency in company's activities. Data integration enables receipt of information at the right time and at the right place. ERP does not only improve purchase department activities it also helps to improve the overall efficiency and profitability of all the activities in the company.

8.2.12 ERP for streamlining business processes and reducing operational costs

Customer challenge

Cole Haan is an international lifestyle brand based in the US; they specialize in men's and women's footwear and accessories. They strive to operate efficiently and maximize return on capital. They faced the difficulty of integrating financials with other critical business systems. Streamlining business processes and building enterprise-wide visibility were their strategic goals. Key challenges faced by them were slow financial close, reducing visibility and timeliness of data which in turn led to difficulties in determining their products' performance in the marketplace and efforts required to keep non-integrated systems coordinated to increase ROI and efficiency in all their processes.

Solution

They implemented SAP's products for achieving their goals and overcoming key challenges. mySAP ERP financials solution and SAP apparel and footwear application were implemented. The company now has an integrated system that supports its business development and has a good base for its future business for years to come.

Outcomes

Significant outcomes were observed as the business processes began to get streamlined. It reduced manufacturing time by about 40%. Per day sales outstanding improved by 5%. There was an increase in proactive customer support. Resources utilized for credit and collections reduced by 10%. A platform was created for growth. It helped the company to meet their customers' requirements on time.

Findings

ERP reduces cost spent for business, as it streamlines business and gives a clear idea for the decision-maker to cut costs. Various avenues that have scope for improvement can also be identified by using ERP.

8.2.13 A software to avoid data redundancy and improve financial processes

Customer challenge

General Pants Company, a leading apparel manufacturer in Australia and having a wide presence with 69 stores and a workforce of about 1,500 employees, wanted a transparent accounting and financial system along with efficient

analytics to take key decisions. They wanted to avoid data redundancy and increase data accuracy within the organization. Their other strategic goals were to improve operational effectiveness, build a foundation to support future growth and expansion, and improve compliance with corporate governance. Key challenges were lack of standardized processes and procedures, non-integrated applications resulting in redundant data entry, inefficient manual reporting processes, inadequate financial systems, and poor data quality hindering financial analysis and decision-making.

Solution

mySAP All-in-One partner solution was implemented in the company to improve its overall financial and operational efficiency thereby leading to better customer service and business expansion. It made decision-making easy for the company and provided automated reports for taking strategic business decisions. The solution formed the base for implementing new logistics and merchandising solutions in the future.

Outcomes

The value realization figures serve as a testimony for the successful of SAP All in One, given a 15.8% ROI in three years. There was an internal rate of return of 30% over three years and a 15% increase in incremental revenues. It reduced reconciliation of errors and reversal of journal entries thereby avoiding data mismatch. Improved systematic entry of all financial data led to avoidance of data redundancy errors. There was improved inventory visibility and control.

Findings

Implementing ERP leads to increased effectiveness of financial and accounting processes. It avoids data mismatch and data redundancy. Overall corporate image and customer satisfaction improve with the use of ERP.

8.2.14 Accelerating business growth by using ERP

Customer challenge

Mascot International is a Danish work-wear company that designs, manufactures, and distributes 1,200 different work-wear products across the entire Europe. They were looking for an ERP to help them achieve the following goals: accelerated growth, delivering high-quality and innovative products at lower costs, streamlining CRM-based business processes, enhancing management's control and providing them better visibility and sharper insights into all the activities of the organization, and use of CRM to support strategic globalization and cost-saving objectives.

Solution

SAP R/3, SAP AFS, mySAP CRM, and SAP Internet sales package were implemented by the company to achieve their strategic objectives. mySAP CRM was implemented in five weeks resulting in reduced implementation costs and quick turnaround on its investment. This was achieved by SAP's packaged solutions and best practices. Systematic ERP implementations helped them achieve their strategic objectives in due course of time.

Outcomes

Usage of ERP system led to an increase in sales growth and thus revenues by 7.5% year on year. This was possible due to the ready availability of accurate information in real-time, and it was possible in turn to increase sales substantially. There was a reported annual growth rate of 20% to 25% without deputing more employees. There was a 28.3% reduction in total cost of ownership, including labor and hardware.

Findings

ERP packages can be implemented in a short time by following the best practices advised by the vendor. Proper usage of ERP leads to better growth due to efficient management of processes and people.

8.2.15 Managing the business processes

Customer challenge

World's first fully integrated textile company having all operations, from spinning, weaving, garmenting to retailing, did not have even a basic ERP software. They were also making their presence felt in the global market. They were utilizing Microsoft Excel files for maintaining data and a standalone financial system for finance management. This rudimentary set-up led to various challenges like dip in sales revenue and delayed dispatches caused by inadequate and slow transfer of information, excess inventory in warehouse, inability in keeping track of goods movement between plants and all of these leading to inventory becoming liabilities and delay in preparation of stock reports and crucial management information system (MIS) reports.

Solution

An integrated solution spanning all business areas along with online information tracking ability was what the company required. It partnered with Zensar to implement SAP ERP 6.0 Zensar's export management system to take care of all the core areas, such as finance control, costing, materials management, production planning, quality management, and sales and distribution. Zensar took care of the entire implementation process, starting

from defining scope and designing developing, and managing modules for a variety of processes and to training and ongoing application management support.

Outcomes

It resulted in accurate flow of information across various departments, ranging from sales, material management, production, and finance. Information tracking improved with visibility in all the processes, starting from material received to finished goods dispatch. Inventory was maintained properly, leading to quick generation of reports when required. Daily production report was automatically available, making all the MIS report preparation work easier. Overall management of all the activities became easy after implementing ERP.

Findings

ERP can take care of basic activities like managing a business process or an activity, in addition to critical functions like gathering business intelligence (BI) that plays a vital role in management decision-making. Reports are the most important weapon that enables managers to take quick decisions. ERP provides comprehensive reports within a short time, enabling managers to exercise effective control over processes.

8.2.16 ERP for quality management

Customer challenge

TATA group is a leading player of textile industry in Pakistan. It is one of the most modern yarn manufacturing companies in Pakistan producing super-quality yarns for the international market. They have spinning mills in three different locations in Pakistan with head office situated at one of the three locations. It was difficult for the company to manage the quality of yarn and also get integrated reports for the senior management based at the head office. There were delays in getting reports on quality and consolidating the product quality reports proved indeed a cumbersome task for them. They were looking for a system that can fetch and provide quality data from all the quality testing instruments automatically after tests were concluded.

Solution

They went for the ERP software provided by Premier Evolvics Private Limited, a company based in Coimbatore, India, and a leading textile instruments manufacturer who provides the package named ERP Texpert specifically catering to spinning industries. The software helped them monitor yarn quality online and in getting reports without any delay.

Outcomes

All the mills were able to provide quality data in the same format and also in one report thereby enabling comparison of product quality between different units. Reports from all instruments were transferred automatically to the ERP software and results were directly delivered to concerned managers' mail boxes. Human errors in data entry were avoided as automatic data transfer was enabled. The head office team was able to get data quickly. Having the required data helped them generate reports needed for various analyses.

Findings

ERP software helps the organization to more effectively manage quality, production, finance, and all other activities. Machine integration was a key concept required by TATA; it was available Texpert, and Texpert enabled them to get quick and accurate information without any human intervention.

8.3 Areas of improvement

The foregoing success stories indicate how ERP is useful for textile and apparel industry. However, there are various areas needing improvement; one needs to understand and take care of those to ensure that every ERP implementation is a success story.

8.3.1 Employees resistance to change

Business situation

In Thailand, a famous textile institute suggested that ERP implementation is essential for increasing efficiency of the garment companies and SCM. A garment company implemented ERP in Thailand, expecting quality improvement and cost reduction through elimination of overlapping activities and gaining more competitive advantages.

Areas of improvement

Although the company succeeded in its goals, there were few obstacles faced during implementation. The major obstacle was resistance to change from employees due to lack of clear understanding. There were also issues during parallel run, as employees had to make entries both manually and in ERP system, which meant double work.

Solution

Such situations can be overcome by having employees as a part of the ERP selection process and educating them about the need for ERP. Training courses should be conducted to create more awareness in the user's minds

and reduce their resistance. ERP implementers should meet users frequently and solve their queries immediately to make them confident about using ERP.

8.3.2 Huge inventory problems and overdue deliveries

Business situation

A leading athletic shoe and clothing giant faced a major crisis due to ERP implementation. It had a problem with its supply and demand planning software. The software incorrectly placed orders for a particular type of sneakers, whereas market requirement was different. Due to this error, there were huge inventory and overdue deliveries piled up at the client side.

Areas of improvement

The situation occurred due to improper demand and supply management. The reason for this issue could have been impatience in the customer's mind to get the software running quickly, which in all likelihood led to inadequate testing and also parallel usage of legacy systems.

Solution

Proper controls were not established at each and every stage of order placement and processing. Supply and demand should be managed accurately by proper planning and systematic checking of order release. Company management should be patient during implementation and have a understanding of the system to ensure that there are no such errors as discussed previously. More practical testing should be done using real-time data to ascertain uncertainties and errors that might surface during live run and continuous usage thereafter.

8.3.3 Implementers incompetence

Business situation

A leading apparel company wanted to implement ERP software and selected a vendor for implementation. During the implementation phase, it was found that the implementation engineers who came for implementation did not understand the business processes correctly and it resulted in a huge loss of time and energy for the company. All the activities carried out for few weeks were not of any use due to the implementer's inadequate understanding of functions and processes in the company.

Solution

Most vendors now have implementers possessing sound business domain knowledge. However, in the present times, it is seldom the case that implementers lack knowledge on business processes and fine-tuning their

ERP product to work with those processes. In this case, the company ought to have identified the problems early on during the implementation phase and told the vendor to avoid delays and terminate the inadequate (and flawed) training given to their employees; therefore, by closely monitoring the implementation process and advising the vendor appropriately well in time about potential pitfalls en route to completing the implementation, company could have foreseen the impending huge loss of time and money it had to suffer on account of vendor's lack of knowledge about its business processes.

8.3.4 Top management support for ERP usage

Business situation

A leading composite manufacturing company implemented ERP solution across all its verticals. The time to conclude implementation was fixed as one year. However, it took more than two years to complete and even after concluding the implementation, the company was not ready to go for live run. It was found that employees' reluctance to change was not the only problem in the company; it was the absence of top management's direct involvement and interest that stalled the success of implementation. The top management did not address employees and sensitized them about the benefits of using ERP and urged them to extend their support and cooperation in implementing ERP. They just purchased the software and forgot about it. The top management was not much concerned about implementing ERP, and the result was a huge loss in relation to time lost training the workforce to use a faulty system, loss of productivity from staff who had to leave their work stations to take part in training, disruption in regular activities caused by parallel running of faulty ERP with existing systems, and dissatisfaction among employees. It had also made resource management difficult for the vendor, as they had to keep their training resources in the client premises all the time.

Solution

From the foregoing, it is evident that top management should be directly involved in enforcing the use of ERP. A team should be formed involving top management to address issues related to implementation and live usage. Proper grievance-handling mechanism should be put in place to clear problems faced by employees and also the vendor during implementation and usage. Vendors should fix a timeframe for implementation, and if they perceive the timeframe needs to be extended, they should start charging the client; this way top management is made aware that ERP implementation is time-bound and implementation going beyond the stipulated timeframe incurs additional costs.

8.3.5 Incorrect selection of ERP package

Business situation

A world-renowned weaving company in India wanted to implement ERP in their weaving business. They did not do enough research on evaluating and selecting the right ERP package. They went for a vendor who was able to market his product better. They expected the software to have all the reports required, as the vendor informed them that it will be provided. During implementation and parallel run, it was found that many of their requirements were not met by the vendor and some of the processes built in the ERP system did not suit their weaving vertical. Reports that were provided did not solve their purpose and decision-making became a problem.

Solution

Proper selection of ERP package is a critical step in implementation. Client should check whether the ERP solution provided by the vendor is suitable for their vertical. Client should obtain all the required reports from the system and check whether they can meet their requirements before purchasing the software. It is essential that feedback is obtained from the other clients of the vendor to know whether their ERP software is working better for them. Proper study of business requirement should be done prior to implementation to avoid such shortcomings.

8.3.6 Improper planning of implementation

Business situation

This situation was evident during an implementation in a foreign country. An ERP vendor based in South India showcased their ERP product and obtained the order. The vendor was a new entrant in the market. The vendor assumed it would take six months to implement their package in the particular garment industry and confirmed this time period and signed and accepted the contract. During the software development and implementation phases, vendor realized that the time frame of six months is not enough to complete even one-third of the implementation. The client was not aware of this and expected the implementation to complete within the stipulated time. However, it took more than a year and a half to complete the implementation, giving raise to client's frustration on account of the vendor delaying the implementation and wasting their time and resources.

Solution

A road map to implementation should be decided before implementation. Both parties should clearly understand this roadmap and plan the implementation

accordingly. Weekly review meetings should be conducted to ascertain the progress during implementation. Therefore, before placing orders, customers should check whether the chosen vendor has the potential and capability to deliver services without fail based on contract.

8.3.7 Customization and requirement study

Business situation

A leading apparel company in India purchased ERP software to handle their garment business. They did not have a dedicated team to handle implementation. Furthermore, many employees left during the implementation phase. There was no particular person deputed by the company to coordinate with the ERP vendor to gather input about company requirements to be met by the ERP software. Finally, when they gathered the relevant information and company's requirements and were about to implement the software, they were given additional inputs and requirements to be incorporated into the ERP, over and above what was discussed and mutually agreed. The company came up with lot of customization requests that extended the implementation time and led to dilemma and unwillingness to do additional work for implementing inputs that were conveyed only at the time the vendor concluded the customization process and was ready to do live run.

Solution

Such situations can be avoided with a proper business requirement study. Customer should be made aware of the significance of having a proper team in place till the conclusion of ERP implementation. A business process requirement document should be prepared and signed by all concerned to ensure that the client does not insist on adding more requirements at the last minute prior to implementation. Client should check the software properly and ask for all customizations and requirements during the study itself and not after signing the business requirement document.

8.4 Discontinuous usage of ERP

Business situation

In a textile processing industry, ERP was implemented successfully. The various reports required by the company were obtained through ERP. All the quality reports were obtained automatically through ERP and this aided in senior management's decision-making. However, after running the ERP for a few months, users became more complacent and avoided making proper entries in ERP. Due to this, reports taken from the ERP were not accurate and affected the decision-making process. Users started finding faults with the system and used them as an excuse to avoid making entries.

Solution

Continuous usage of ERP has to be ensured by the project leader, IT department, and the senior management. Users should be trained and counseled frequently and made aware of the benefits of using ERP. Client should check for errors in the system and rectify it by contacting the vendor so that entries are not stalled. Frequent monitoring is essential for continuous usage. Full benefits of ERP system can be achieved only after continuous usage. Vendor should keep adding updates to the system/customer server with the help of the client's IT department. Errors reported in system's functioning should be notified and corrected on time. Proper mechanism should be available for bug-reporting and correction.

Summary

Various success stories of using ERP system in the context of textile and apparel vertical are discussed. Many cases related to national and international companies are presented to better understand how ERP works. Challenges, solutions, outcomes, and findings from each case are provided to increase reader's awareness of benefits of using ERP. Business situations that need critical attention and improvement for proper working of ERPs are also discussed.

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In this chapter, career opportunities in ERP are discussed. The chapter gives a clear idea for a textile/apparel technologist on what kind of employment opportunities ERP can provide. It also highlights entrepreneurial opportunities for textile/apparel technologists in the field of ERP. It discusses the opportunities available for textile/apparel technologists to become ERP consultants. Courses available for aspirants to study and qualify as ERP professionals and level of experience required for jobs in the field of ERP are also discussed. The various avenues available along with the skill sets required for aspiring ERP professionals to get jobs are also discussed. Opportunities available for fresh graduates are also discussed.

Keywords: Functional consultant, implementation consultant, business development manager, SAP, Datatex, Infor, Epicor, Ramco, Exilant

9.1 Employment opportunity

ERP offers a wide range of employment opportunities for textile/apparel technologists. Opportunities are available for both fresh graduates and experienced professionals. There are two areas where one can get employed. One avenue is working for an ERP developer, and the other is working for a textile/apparel company where ERP is implemented. ERP jobs in ERP developer will always involve travel and staying at customer places for longer durations to complete implementations. Most ERP companies prefer males for jobs, except for job positions such as testing experts and programmers. The various employment opportunities available are discussed as follows:

Positions available with an ERP developer

- Functional consultant
- Implementation consultant
- Technical lead
- Business development manager
- Testing/Quality team
- Programmer

Career options available in relation to ERP available in a textile/apparel company

- IT manager
- ERP project lead/consultant

9.1.1 Functional consultant

Role: A functional consultant conducts a business process study at the customer's premises and finalizes client requirements. In the case of SAP, the functional consultant conducts the business process study as well as implements ERP. Module-wise consultants are deputed to implement ERP.

Experience: A textile/apparel technologist comes with an experience of at least two years in textile/apparel industry. Sound domain knowledge is expected for this role. In the case of ERPs like SAP, graduates with two years experience in any domain are preferred.

Skills: Ideal candidate possesses good knowledge and technical knowhow in textile/apparel processes and have strong negotiation, communication, and managerial skills. In the case of SAP ERP, in-depth knowledge on any one domain would be sufficient.

Opportunities: All the software companies that develop ERP systems will require a functional consultant, and, hence, scope for getting jobs is higher.

For ERPs like SAP, it is expected that consultants have at least two years of domain experience. SAP functional consultants implement ERP not only for textile companies but also for all types of industries, including for other types of manufacturing industries and also automobile industry. Consultants are expected to possess sound knowledge of the domain where ERP is required to be implemented. One of the easiest ways to become a functional consultant in SAP is that an individual should possess at least a two-year work experience in any one department in an industry and then do a SAP course at any one of the SAP authorized training institutes to get SAP certification. This is the minimum an ideal candidate is expected to possess before applying for a position job in companies requiring SAP functional consultants.

An example is given to explain how textile/apparel technologists can become a SAP functional consultant. The candidate needs to work in a textile company production department for two years and then do a course on SAP Business One or R3 in production planning module and obtain SAP certification. After that he can apply for a consultant position and get it. Experienced personnel will get good salaries, starting from Rs.6,00,000 per annum; salaries offered will vary based on candidate's experience. Similarly, a person with store management experience can do a course on materials management module (MM) and get a job on implementing the MM module.

Fresh graduates can also do a course on SAP, get certified, and then work as a functional consultant with a starting salary of Rs.20,000/- a month. However, it is advisable to have prior work experience of at least two years in the industry before becoming a functional consultant.

9.1.2 Implementation consultant

Role: He implements ERP at customer's place, trains the customer, and coordinates and handles parallel-run and live-run activities.

Experience: A textile/apparel technologist must possess a work experience of at least two years in the textile/apparel industry. He is expected to possess sound knowledge of the work domain for which ERP is required.

Skills: An ideal candidate possesses good knowledge and technical knowhow on textile/apparel processes and has negotiation, communication, and managerial skills. The candidate should have knowledge about the various business processes in a textile/apparel company.

Opportunities: All software companies that implement ERP systems require implementation consultants; hence the scope for getting jobs is higher.

Requirement for implementation consultant is increasing day by day. Consultants with experience of working in a company where ERP is already implemented running or those who had successfully carried out one or two implementations are in huge demand today. Fresh graduates can also try for becoming implementation consultants; however, it is difficult for them to understand the entire business processes of textile/apparel industry without having any practical experience. It is advisable that candidate possess at least two years of work experience in a textile/apparel industry before applying for ERP consultant jobs.

9.1.3 Technical lead

Role: Responsible for leading a team of implementers and also managing the development of ERP software in association with software developers.

Experience: Ideal candidate is a textile/apparel technologist with a work experience of at least two years in textile/apparel industry. It is not an entry-level position. Implementation consultants and functional consultants can get elevated to this role. It is also possible for apparel/textile technologists with more than 10 years of experience to become technical leads.

Skills: Candidate must possess good knowledge and technical knowhow on textile/apparel processes and have strong negotiation, communication, and managerial skills. Knowledge on software developing would be an added advantage in applying for this position.

Opportunities: ERP companies need a technical lead to oversee implementers and also take care of business requirements in coordination with the software team. "Implementation managers" is an alternate term used by few ERP companies, which essentially means the same role, that is, "Technical lead."

9.1.4 Business development manager

Role: This position is responsible for developing the ERP business. This manager visits potential industries and find markets to develop ERP business. He gives product demos so that the textile companies are encouraged to buy the ERP product. He conducts price negotiations prior to closing the sale of ERP product.

Experience: Ideal candidate is a textile/apparel technologist with a work experience of at least two years in the textile/apparel industry. It is not an entry-level position. Implementation consultants and functional consultants can get elevated to this role. It is also possible for apparel/textile technologists with more than 10 years of experience to become a BDM directly.

Skills: The position entails candidates possess good knowledge and technical knowhow on textile/apparel processes and have strong negotiation, communication, and managerial skills. Marketing skills are essential for this position. A degree in management is an added advantage.

Opportunities: ERP companies always strive to expand business; hence, there is always a need for BDMs. BDMs are different from marketing managers because they know the various processes of the company and would be able to suggest appropriate solutions to clients and convince them to buy the ERP product.

9.1.5 Testing/quality team

Role: In this role, candidate is responsible for testing or checking ERP transactions and reporting back to the company whether their ERP has satisfied user's requirements. As a person in the testing team, he or she will conduct trial runs and study test use instances and verify and approve whether all the requirements have been met prior to and for implementation. All the software developments made by programmers are checked by this team to ensure it is in line with the business processes and that data provided in the report are correct.

Experience: An ideal candidate for this position is a textile/apparel technologist with a work experience of at least two years in textile/apparel industry. Possessing a certificate of diploma in software testing will be an added advantage.

Skills: Candidate must possess good knowledge and strong technical knowhow on all the operations and processes in the textile/apparel industry. Software testing skills are also required.

Opportunities: ERP companies use this quality or testing team to test all transactions and reports before taking them to the client site for approval.

It is an integral part of developing and customizing ERP based on customer requirements. Hence, the scope for a textile/apparel technologist to get this job is immense.

9.1.6 Programmer

Role: Programmers obviously develop the ERP software as well as develop modules and submodules that form part of the ERP software package and thus are the creator of the ERP system to be used in line with client requirements.

Experience: A textile/apparel technologist can also opt for this position, but he should also possess software programming and coding skills. In order to qualify for this position, he or she should first do a course in software development and then try for this position. Thus, it requires longer time for a textile/apparel technologist to qualify for this position since he will also need to acquire software developing skills in relation to developing the ERP software.

Skills: Good knowledge and technical knowhow on software development is essential.

Opportunities: The opportunities are comparatively limited for this role, as computer science graduates are normally hired for this position in the ERP companies. However, only people who are more inclined to diversify into software developing apply for jobs in this area, as what work experience they already possess may not be of use in this domain. Thus, core skills needed here are programming and coding.

9.1.7 IT manager

Role: Responsible for managing the running of ERP system in a textile/apparel company. He should train people on ERP, take care of system issues, report errors to vendor, update new version of ERP given by vendor, clarify doubts for users, and also look for new improvements in software or any new IT product coming up in the market that can benefit the company.

Experience: A textile/apparel technologist with a work experience of at least five years in textile/apparel industry. It is not an entry-level position. Implementation consultants and functional consultants can apply for this position. It is possible to join as a technical assistant and then get elevated to this role.

Skills: To qualify, candidates must have good knowledge and technical knowhow on textile/apparel processes and possess strong negotiation, communication, and managerial skills. Knowledge on ERP and how to manage IT systems in a company is also essential.

Opportunities: ERP systems can fail if there is no proper IT technician available at the client's place. Every ERP vendor requires that their clients have people with appropriate skills deputed to coordinate with the vendor for smooth implementation and running of the ERP software; hence opportunities are very high as most companies now have an ERP system running.

9.1.8 ERP project lead/consultant

Role: This position is responsible for managing the implementation and running of ERP system in a textile/apparel company. He should manage working of ERP in a company. He should be able to negotiate with vendors, in various spheres, starting from evaluation, selection, and pricing to issues faced during live-run of ERP and its continued usage thereafter at the client's premises.

Experience: Ideal candidate is a textile/apparel technologist with work experience of at least five years in textile/apparel industry. It is not an entry-level position. Implementation consultants and functional consultants can apply for this position.

Skills: Candidate should have good knowledge and technical knowhow on textile/apparel processes and possess strong negotiation, communication, and managerial skills. Knowledge on ERP and having experience in managing end-to-end implementations at the client's place is also a key requirement.

Opportunities: Every company needs a project lead or consultant for smooth implementation and running of ERP. Scope is immense for this role. This position is most sought after by people with experience in implementing ERP, as they need not travel and can stay at one place.

Having prior experience in working with ERP is an added advantage for employees when applying for jobs in any other company, as currently companies prefer technicians or technologists having prior experience in working with an ERP system. In the current ERP development scenario, it can be seen that companies have begun to create and implement ERP on their own; this again leads to creation of more jobs for professionals such as implementation consultant, project lead, IT administrator, developer, and so on.

Employment opportunities for ERP are increasing day by day. It can be found by just searching online for "ERP jobs in textile"; the search will yield so many job websites announcing plenty of openings for textile/apparel technologists. Salary packages are compelling enough for aspiring professionals to pursue a career in ERP. However, when choosing ERP as career, the following points should be kept in mind:

- i. ERP implementation jobs involve lot of travel and also prolonged stay at client's site. Thus, it is difficult for married professionals with a

family to manage to travel all the time and stay out of station for longer periods, given that clients are located everywhere in the country and the implementation expert can execute his work only by working at the client's premises.

- ii.* It is better to study ERP courses at authorized training centers and the individual should verify the caliber of such centers before enrolling for training classes.
- iii.* What ERP giants like SAP/Microsoft/Oracle mainly look for in a candidate is how many end-to-end implementations he or she had completed earlier. So it is better to get employed initially with smaller ERP vendors and then join big companies after gaining experience.
- iv.* Studying ERP certification courses by paying a huge amount of money may not be useful for all, as sometimes those companies also recruit candidates who do not have certification, as they may prefer an experienced candidate with solid domain knowledge but does not have an ERP certificate. For companies like SAP, working with an official SAP partner for one year will give them access to write certification exam. Only if a candidate is sure that attending and completing such a certification exam will be an added advantage and improve his chances of getting hired, he or she can take courses and/or write such exams.
- v.* Fresh graduates will be recruited for contract jobs initially in some cases and only after gaining more experience they will be absorbed into regular/permanent employment positions.

9.2 Entrepreneurial opportunity

ERP also provides entrepreneurial opportunities for textile/apparel technologists. The various business opportunities offered by ERP are as follows:

- i.* Create a new ERP software

With experience as an implementer, a functional consultant, or as an ERP manager, one may go for developing new ERP software that may have features that overcome the shortcomings of existing systems available in the market. The investment required will depend on the size of the company and the businesses (whether it can cover all the verticals of textile business, like spinning, knitting, processing, weaving, etc.) that it is expected to support. Candidates are expected to have in-depth knowledge on domain and software/hardware requirements of ERP so that better software can be developed.

ii. Develop ERP modules

If building a new ERP software involves more manpower and investment, one can look at the option of developing modules in ERP. One may be well-versed in a particular area like inventory, procurement, finance, or production. In that case, they may develop only a specific module of ERP that can be customized and fit with any other ERP software. These are small, standalone packages that can be integrated with any type of ERP. For example, a planning module can be built for a garment company. Most ERPs do not have a planning module. Hence, a planning module can be sold as a standalone package to clients who will then integrate it with their existing ERP systems.

iii. ERP consultant

This is a most viable option for a person with strong experience and possessing good knowledge on the working of ERP systems. An ERP consultant firm can help clients choose a vendor, negotiate with the vendors, oversee the implementation process, and help clients reap maximum benefits out of using ERP. Another option is to work as a freelance consultant catering to different companies and work exclusively for one company to oversee and manage activities in using ERP. Many consulting companies have come up in the market and offer to take care of ERP evaluation, selection, implementation, and post-implementation activities.

iv. ERP implementation company

This would be most suitable for a group of implementers if they wish to start a business. They can create a company to implement ERP systems at the premises of a client of a third party. Client gives order to vendor, and vendor contacts the implementation company to implement their software in the client's place. The implementation company will be paid based on the man-hours spent on implementing ERP.

Business opportunities in ERP can be identified when one gains sufficient experience in ERP by either working for an ERP company or for a textile/apparel company that is using ERP.

9.3 List of ERP providers

The following list gives website addresses of various ERP companies operating in the textile/apparel industry. Here one can search for ERP careers, in addition to searching for jobs in regular job portals.

- <http://www.sap.com/careers/index.html.html>
- <http://www.datatex.com/en/jobs/index.php>

- <http://www.microsoft.com/en-in/dynamics/default.aspx>
- <http://www.netsuite.com/portal/home.shtml>
- <http://www.sagesoftware.co.in/>
- <http://www.intex-consulting.com/en/intex/home/intex-textile-erp-the-innovative-erp-business-suite-for-textile-companies.html>
- <http://www.ramco.com/>
- <https://www.shoptech.com/>
- <http://jobs.epicor.com/>
- <http://www.infor.com/>
- <http://www.exilant.com/careers.html>
- <https://www.tcsion.com/dotcom/TCSSMB/>
- <http://www.kalsofte.com/careers.htm>
- <http://www.eresourceerp.com/ERP-for-textile-industry.html>
- <http://www.axonindia.com/apparelerp.htm>

Summary

The various career opportunities available in the ERP are discussed. Employment opportunities and business opportunities are discussed separately. Information on the different job roles available in ERP, experience and skills expected of aspiring professionals, and specific career options/opportunities available in ERP are also provided for better understanding. Key points that a textile/apparel technologist should consider while pursuing a career in ERP are also discussed. A list of some of the prominent ERP vendors in the textile and apparel vertical is also provided.

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