CHAPTER 1

Introduction
1.1 Introduction

Nowadays many business organizations are facing challenges from rapidly changing and increasingly competitive global markets. They must serve the customers who want innovative, high quality products which feature special options. The technological developments taking place at the fastest speed are shortening the product life cycle. Further pressures are created by competition which drives organizations to reduce cost, improve productivity to survive and grow. When business firms are very small and all the different functions are managed by a single person, the decisions were made keeping in mind the overall company objectives. However as business firms clock growth, managing the entire operations became impossible for a single person. Managers are brought in to manage different functions. The size of the departments begins to expand as more and more people are required to do the job.

Earlier whatever was produced was absorbed in the market. The world wars, globalization, technological developments have gradually changed the trend. Now it is the customers’ market. The trend can be seen in developing countries like India, Malaysia etc. Organizations are facing great pressures to improve profitability, customer satisfaction, market share, value addition to the products and services they deliver to their customers. Especially manufacturing firms in industries like textiles, chemicals, FMCG, engineering goods etc. are constantly striving to improve the quality and reduce the total cost. They are turning to the use of Information Technology (IT) to make some decisions, which will help them in overcoming a few of these problems and improve efficiency.
To derive benefits from technology a system has to be developed that provides information across all functions cutting departmental barriers. Such systems enable optimum use of all the resources of the organization. This is where Information Technology system called Enterprise Resource Planning (ERP) system comes into picture. ERP is a system which provides up-to-date information, coordinates between different departments and enables the managers to take decisions for organization’s overall objectives rather than the departmental or functional objectives.

Managing different functions like personnel, production, materials, sales and distribution etc., in medium and large scale organizations is becoming a difficult task. Small scale organizations are also not an exception. Very often there is lack of coordination between different departments and this leads to inefficiency. For example, in a firm, the material department would like to have rather a comfortable stock of raw materials, but the finance department insists on lower level of stock to minimize the inventory costs. The marketing department wants to have continuous different varieties of products, whereas the production department wants to produce rather uniform products in a continuous stream on a large scale to reduce set up costs and overhead costs. These conflicts can be easily addressed in ERP systems.

Different departments and the staff should have a common information network for their efficient functioning. Integrated, uniform and up to date information is necessary for the survival and growth of the enterprise. It gives the right power to the right person to make decisions at the right time in the same
perspective. Lack of coordination affects other flow like money and components. Enterprise Resource Planning system is used to draw the real benefits from technology streamlining the flow of information across all functions cutting departmental barriers. Such systems can optimally plan and manage all the resources of the organization. ERP is a system which monitors information, dataflow across various functions and coordinates between them. The most important point is that ERP enables the managers to take decisions in short period of time under existing constraints.

ERP brings together people who work on shared tasks within the same enterprises or in their dealings with suppliers and customers. Enterprises have to ensure smooth flow of information across all levels and between all sections to access the up-to date information. Some of the benefits of ERP system include reduction in cycle time and work-in-process. Other benefits include flexibility, information accuracy, optimum resource utilization, quick decision making capacity. ERP covers the techniques and concepts employed for the integrated management of businesses as a whole, from the viewpoint of the effective use of management resources.

The manufacturing firms that have successfully implemented and are implementing ERP are in automobiles, FMCG, chemicals and pharmaceuticals, etc. Other industries like telecom, banking, insurance, healthcare, education and utilities have also been quick to realize the benefits of ERP.

ERP softwares are integrated packages that support the ERP concepts. ERP is evolution from Material Requirement Planning (MRP I) and Manufacturing
Resource Planning (MRP II). Now there are many ERP software vendors in the competitive market. Players like SAP and Oracle are major players in the market. Other major vendors of ERP are Baan, IFS, and First Logic etc. which have significant presence in India. Some of large scale firms in India have already implemented ERP software in their businesses.

There are different modules for different functions like production, finance, sales and distribution, materials management etc. ERP supports a central database and connects to different modules as shown in Fig no: 1.1

**Fig no: 1.1 ERP Database and integrated information system**

![ERP Database and integrated information system](image)

It is found that many companies are implementing ERP software for the following reasons, to enable improved business performance, to support business growth requirements, to improve responsiveness across the company and to take
advantage of untapped market. There are benefits related to profits, communication, performance, delivery schedule etc. The cost and time involved for implementation of ERP software is also important.

The ERP packages build information base and provide knowledge base for planning and control of the business through the business function management. The ERP is the main system, interfaced or assisted by the other systems in the organization. These systems may stand alone or form a part of the manufacturing or commercial processing systems. These systems provide the database to the ERP or support the ERP by basic data input directly or through the data transfer. For example, the manufacturing system module of the ERP is interfaced with the drawing, engineering database for query, viewing and usage of the drawings and it accepts the data of work order by process operations, for costing and for building the standards for the future.

There are many features of ERP software. The important ones are security authorization, referencing responsibility and the implementation of business rules. These are provided to safeguard the organization from illegal practice and also to protect the valuable information from misuse. These features help to keep the system, the information and the data integrity at the highest level. The ERP is activated by its users. The security is built for the authorized usage and also for selective access. The implementation of the most of ERP packages begin with enterprise modeling which defines the enterprise structure, the authority functions, the processes and the business rules. The enterprise model is the platform for the ERP system implementation.
Information Systems have three components viz., Data management, Application Logic and Presentation. The components are built with the client server role definitions. The client is a user and server provides the service required by the user to run the systems. The architecture is used to separate the data and its management from its application. The architecture choice is influenced by the requirement. The ERP architecture is provided in fig no. 1.2

**Fig no 1.2: Two tier and three tier architecture**

![Diagram of Two Tier and Three Tier Architecture](image)

In the two tier architecture, there are different roles. The data management is handled by the server and its processing is through application logic by client. In this architecture all the requirements are sent to the server by all the users in the network. It affects load in the system. This can be addressed by using high end multiple processor and parallel processing hardware platforms. In three tier architecture application logic and
The servers play two distinct roles of handling the data and the application logic. The architecture is useful when there is not much change in the application logic. It is difficult to recommend one or the other architecture as the solution to overcome a typical requirement. Sometimes the applications logic is split into two parts.

The ERP usage can be controlled at levels, viz., the data, transaction, information and analysis level. The security system of ERP is designed in such a way that only authorized persons can make entries and changes. Authorization is a feature provided in many of ERP systems.

In some of the systems an entry can not be cancelled in finance and control module like in SAP. If a transaction debit entry is entered only credit transaction can be entered to cancel it. For example, in the purchase order transactions the price and discount are confirmed by one user, the terms are decided by the other users and the purchase order is signed by third user. The system provides defined levels to the users and there are no limitations on the number of levels.

The ERP system provides a variety of technology support functions to implement the solution very fast in execution mode. The features can be extended as and when required. The ERP solution provides email facility. This facilitates communication memos, reminders and text to the selected list. It is helpful in sending copies or multiple copies to the concerned persons as stipulated. Through the EDI connectivity, it can transact directly to the vendor on its own.

The ERP system can store purchase orders. Purchase orders are those through which customers place orders for purchase for goods and services and
they contains specifications, number of units required, expected delivery date etc.

Now purchase orders can be placed by customers either through email or over telephone or through website due to growth in internet. ERP software can pick any one of them and raise a new order based on the features of existing orders. Hence a lot of time can be saved in creating a new order with scope for modification and rectification.

The ERP solutions are user friendly which is a major advantage offered by ERP software. The user friendly approach can be used to manage the business with varying business conditions. The solution provides trial posting, simulation for production schedule, the flexible valuation procedure etc. ERP also provides intelligent support in business management. It allows the user to define the events, alert and schedule them at his choice. For example, if a firm receives a cheque as part of payment from customers and it is to be deposited in the bank, the alert feature helps the user to deposit the cheque on a particular date.

The benefits of ERP system in industries are:

- reduction in lead time:
- on time shipment
- reduced quality cost
- upto date information
- decision making capacity
- increased customer satisfaction
- improved supplier relationship
1.2 Scope and significance of the study:

With the changes in technology, customers’ preferences and integrated global market, the thrust is being felt by business firms to adopt information technology to achieve their objectives. The large scale implementation of ERP software by industries has attracted particular interest in recent times. Al-Mashari (2003) recognized, there is still much research needed before the ERP phenomenon can be understood. The developments which led the researcher to carry out the research are ERP success in small and medium size enterprises and ERP success in emerging markets.

ERP Success in Small and Medium-size Enterprises

ERP implementations have been traditionally associated with large enterprises. However, SMEs are more interested in implementing ERP software to improve their business processes. The literatures suggest today that the ERP software vendors are focusing more on SMEs. Loh et al. (2004) observe that besides the increasing adoption of ERP by SMEs, ERP research has been primarily conducted in the context of large enterprises.

ERP in Emerging Markets

Emerging markets around the world are gaining much attention in terms of growth and demand. Maldonado (2009) in his empirical study on ERP implementations in SMEs in Latin American countries observes that organizations in developing economies have begun to use ERP actively. Kohl et al. (2006) support this standpoint and also sustain that, from the very studies available, it appears that significant differences exist in how those ERP systems are adopted.
and implemented across geographies. India is a developing economy. India is one of the largest economies in the world. SSI sector contributes significantly to manufacturing output and has huge potential for exports of the country with vast employment opportunities throughout the country.

**Purpose of the Study**

This study is aimed to look into the issues of implementation of ERP software in small and medium enterprises (SMEs) in Karnataka with a view to study financial implications of ERP software and also the influence of non financial parameters on the financial performance of the firms.

**Significance of the Study**

After the liberalization of economy in India in 1991 the opportunities for industrial growth have increased significantly. Multinational companies have established their businesses either as a subsidiary or as a joint venture with Indian companies. The increase in Foreign Direct investment, the liberalisation policies of the government, improved infrastructure in transport, communication and education etc. have resulted in increased investment in a number of sectors. The large scale private industries have entered oil exploration, refineries, energy, aviation, etc. These large scale industries have made major contribution to the industrial growth. Equally important are small and medium scale enterprises (SMEs). SMEs are trying to capture the market and fill the void which is not covered by large scale industries. In India the Small scale industries (SSI) sector contributes significantly to the total exports of the country. As the SMEs are seeking to increase their productivity and skill sets to compete with large scale
industries, they are concentrating on the use of IT for optimal utilisation of resources. ERP software is one of the technologies SMEs can adopt. The large scale industries are able to afford the huge amount of investment required for ERP in order to reduce cost, increase market share and achieve their objectives.

The research is extensive in the field of implementation of ERP software, critical success factors for implementation of ERP software and post implementation evaluation of ERP software. In addition, literature has mainly focused on large enterprises and only few studies have attempted to validate the proposed models empirically (Somers et al., 2004). The focus of ERP software vendors was on large scale industries. The need for implementation of cost effective and affordable ERP software is felt by SMEs. The results from this research will definitely contribute to the adoption of ERP software by small and medium scale industries in Karnataka.

1.3 Evolution of ERP:

The evolution of ERP has been gradual. It can be traced to the necessity of cost reduction in production activities in manufacturing industries. Hence inventory management gained importance to reduce inventory cost. The ERP applications had their origin \(^1\) in Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRPII) applications. MRP provided a scientific basis for production planning. The development of ERP in phases is depicted in fig no. 1.3

Before the advent of computer technology legacy systems were used in business organisations. Legacy systems are older transaction processing system created for main frame computers which continue to be used to avoid the high cost of replacing or redesigning them. Legacy systems are rigid and expensive to maintain. Their applications are limited to specific purpose and cannot be integrated with other functions. These problems are eliminated in ERP systems as they are flexible and provide integrated approach. ERP systems provide more functions than legacy systems.

1970s the emphasis was placed on material requirement planning and it involved planning the products and parts requirement according to Master Production Schedule (Rashid et al, 2002). The stages in development of ERP (3) broadly is represented below

1.3.1 Inventory control - EOQ system

The EOQ model refers to economic ordering quantity. This concept was aimed at minimizing the total cost of inventory management. The inventory refers to raw materials consumed in the production process. This model helps in determining the quantity of to be ordered so that the total cost of inventory is minimum. The total inventory cost consists of ordering and inventory cost.

There are many models involving economic ordering quantity. There are assumptions that the annual consumption quantity is fixed and instant replenishment happens as and when the inventory level is reduced to zero. The concept of EOQ was later applied to other versions of discount on the quantity. As the industries clocked growth rate, gradually the scale of activities and output produced by the industries also increased. The more comprehensive approach was required not only for inventory management, but also for scheduling and assignment activities in industries. This need gave rise to Material requirement Planning (MRP I).

1.3.2 Material Requirement Planning

Material Requirement Planning (MRP) is a computer based system that gives information about the required amount of raw material, parts and sub assemblies needed to produce each end item in each plan period. MRP provides a method that helps keep order due date valid, even after orders are released to the shop floor or outside vendor. The information flow for planning and controlling with MRP is shown in fig no. 1.4

MRP supports aggregate planning production activities over time horizon of 3 to 15 months. These 3 to 15 months time period is referred to as medium term horizon. MRP makes use of forecasted demand and customer orders, inventory status file, bill of materials as inputs and produces the schedule of production of finished goods (end items), quantity of all the end items, when the orders are to be released to shop floor to make or buy the components.
Fig no 1.4: Information flow with MRP

The entire MRP is driven by master Production Schedule (MPS). MRP uses inputs like master production schedule, bill of materials (BOM) and inventory status file and produces outputs like inventory transaction data, planned order schedule and exception reports. The inputs and outputs are depicted in Fig no 1.5. MRP though, a tool in production function, is also associated with marketing function.

**Fig no 1.5: MRP Inputs and Outputs**

<table>
<thead>
<tr>
<th>INPUTS</th>
<th>PROCESSING</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory status file</td>
<td>MPS System</td>
<td>Inventory transaction data</td>
</tr>
<tr>
<td>MPS file</td>
<td></td>
<td>Planned order schedule</td>
</tr>
<tr>
<td>BOM file</td>
<td></td>
<td>Exception order</td>
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As MRP was not integrated with other functions for making use of resources of other functions, the need was felt to integrate other functions. The concept of MRP was extended to other functions like materials, finance, personnel and marketing functions. As a result of this, the concept of Manufacturing Resource Planning (MRP II) was developed. The integration with other functions gives an integrated approach.
1.3.3 Manufacturing Resource Planning (MRP II)

MRP II has wider scope and relevant features. MRP II was developed as a computer system as it was complex and time consuming process. As computer technology in 1970s developed, MRP II also gained popularity for its planning and integration functions. As computers can store and organize the data, the MRP II was found to be more effective. As MRP II relies on master production schedule, bill of material etc, there could be more analysis of optimal scheduling, sequencing parameters. A firm can use MRP II to simulate the effect of different master production schedules on material usage, labour, labour hours and capital requirement. Flowchart for MRP II is represented in Fig no. 1.6

MRP II system strives to increase the firm’s overall efficiency by providing management information. Along with MRP II other concepts are also developed to support the improvement in efficiency levels. One such concept developed is Distribution Requirement Planning (DRP). DRP system assists the firms which maintain distribution inventories in field warehouses, distribution centres and so forth, by improving the linkage between market place and manufacturing activities.

In this process a production plan is developed from a business plan to specify production levels for each month for each product line for next one to three years. Once the production plan is accepted by all the functional departments, it becomes a commitment for all concerned. The production department is expected to produce at the committed levels, the sales department to sell at these and finance department to ensure adequate financial resources for these levels of production.
Fig no 1.6: Integrated system of MRP II

Based on the production plan, the MPS specifies the quantities of specific products to be produced every week. Rough cut capacity plan is done to determine whether the capacity available is adequate to sustain the proposed MPS. The MPS is then used to generate material requirements and priority schedules for production. Thereafter detailed capacity planning is done to determine whether the

capacity is sufficient for producing specific components at each work centre during the scheduled time periods. After a realistic capacity feasible schedule is developed, the plan is executed.

Apart from these there are other concepts are Just-in-Time (JIT) and Kanban and Toyota Production System (TPS). These concepts originated in Japan. In the mean time Computer Aided Design/Computer Aided Manufacturing systems, Product Data Management, Engineer-to-Order and Configure-to-Order Systems also developed which helped boost efficiency in manufacturing activities. With the growth of these concepts and tools a new system was taking shape and it is how Enterprise Resource Planning system emerged.

1.3.4 Enterprise Application Integration

The ERP software can be integrated with other systems. The other systems like computer aided design, computer aided manufacturing, customer relationship management, supplier relationship management and computer integrated manufacturing are extensively used in industries. When ERP system is integrated with these systems to achieve higher integrity, it results in enterprise application integration (EAI). The concept of EAI is depicted in fig no: 1.7

Computer Aided Design and Computer Aided Manufacturing (CAD/CAM) is a system that helps in designing the product as per the specifications and manufacture the product. Customer Relationship Management (CRM) is a system that helps in sharing the information about product, delivery and schedules with customers. Computer Integrated Manufacturing (CIM) is the tool that integrates concept, design, production and feedback from the customers.
Supply Chain Management (SCM) consists of all stages in servicing the customers to fulfill their expectations. The drivers are SCM include inventory, Information, Transportation and customer satisfaction.

In a business firm the features like CAD/CAM, CRM, SCM etc. are being used extensively to enhance the features of IT system. Other systems like Document management System (DMS), Communication Management System (CMS) and Security Management System (SMS) can also be integrated.