CHAPTER 4

ERP Modules and Software
4.1 Modules of ERP

Madapusi (2009) in his study used a theory driven approach to field-test an ERP system implementation model in the Indian ERP market. His findings suggest that the implementation of twelve ERP modules make significant contributions to one or more of the ten performance measures. Business organizations that implement a holistic ERP system or intra-firm and inter-firm module sub-systems obtain overall performance benefits. All the thirteen Critical Success Factors (CSF) have varying significant interactional effects with individual modules to impact one or more of the ten performance measures.

A firm may implement all ERP modules at a time in all locations which is referred to as Big bang approach. This approach is adopted by small scale companies going in for ERP software in one or two locations. It reduces implementation time and cost. There is also disadvantage of high risk failure. All ERP softwares consist of many modules. SAP consists of 27 modules. The number and features vary with ERP package.

If a firm first goes for ERP implementation in one plant for all the modules it is referred to as Rollout approach. This location is a representative one and this is the place which is used by the firm to build the global template that covers most of the company process. The most common modules of ERP softwares are

- Finance and Accounting
- Production Management
- Sales and Distribution
- Materials Management
4.1.1 Finance and Accounting:

This module deals with accounting aspects. All accounting transactions are recorded. This is useful for Accounts and Finance Managers. Some ERP packages also provide Cost control functions which are helpful in cost control and decision making in which case it is called FI/CO module. Usually this module comprises following sub modules. These sub modules provide an overview of financial solutions and they are described below.
Financial Accounting module gives the enterprise the ability centrally tracks financial accounting data within an international framework of multiple companies, languages, currencies and chart of accounts. It comprises General ledger, Accounts receivables, Accounts payable, Fixed Assts Accounting.

Investment Management: It provides extensive support for investment processes right from planning through settlement. Investment management facilitates investment planning and budgeting at a level higher than that needed for specific orders or projects. The investment program allows the firm to distribute budgets, which are used during the capital spending process. The system helps the firm monitor and thereby avoids budget overruns.

Controlling: This system gathers the functions required for effective internal cost accounting. It offers a versatile information system, with standard reports and analysis paths for the most common questions. In the treasury component the system provides the firm with a basis for effective liquidity, portfolio and risk management. The Treasury component comprises Cash management, Treasury management, Funds management, Market risk management.

Enterprise Controlling: It comprises of those functions that will optimize shareholder value, while meeting internal objectives for growth and investment. This module usually includes Executive information system, Business planning and budgeting, Profit centre accounting.

4.1.2 Production Management:

This is usually referred to PM module. In manufacturing the activities include machining by machine tools, pressing, forging, rolling, extrusion, welding,
casting etc. apart from other activities depending on nature of business. In chemical industries it involves mixing of chemicals and heating, cooling etc. In oil industry it involves processing, filtering of crude, extraction etc. All of these activities are carried out with an aim of reducing the cost, improving output level and quality. The production can be carried out in job, batch or continuous basis. All of these are supported by Production module of ERP packages.

A robust system of manufacturing planning business process and execution must satisfy a variety of business practices and production methods. Manufacturers must accomplish the task quickly, efficiently and cost effectively to remain profitable and competitive. The PM module aims at planning production activities with reference to customer order, assignment of jobs to machines, scheduling, determining the methods to be employed and optimum resources required like labour, capital etc.

This module involves the following sub modules:

- Material and Capacity Planning
- Shop floor Control
- Quality Control
- Just In time
- Cost Management
- Engineering Data Management
- Engineering Change Control
- Configuration Management
- Lot control and tooling
Financial Implications of ERP Software Implementation in Small and Medium Industries in Karnataka

4.1.3 Sales and Distribution Management

Usually this module is referred to as SD module. As technological barriers have come down the thrust is on marketing and sales. The response to customers should be quick, the lead time has to be reduced, service level has to be increased and cost of shipping has to be reduced. These issues are addressed by Sales and distribution management module.

Increased efficiency in sales and distribution is a key criterion to ensure that firms retain a competitive edge and improve profitability and customer service. Depending on how the system is configured, the functions may be completely automated or may also require some manual processing. The data that results from these basic functions is stored in the system where it can be displayed and changed manually during subsequent processing.

The SD module very actively interacts with the other module for delivery and billing. The following are sub modules:

- Master Data Management
- Order Management
- Warehouse Management
- Shipment
-Billing
- Pricing
- Sales support
- Foreign Trade
4.1.4 **Material Management**

It is referred to as MM module. In a manufacturing firm materials account for 30% to 70% of total cost of goods sold. Materials have to be procured from right vendors at right time. The materials required for production have to be identified and ordered from reliable vendors. It involves reducing the inventory cost and also maintaining sufficient buffer stock so as stock out does not happen, otherwise stock out cost will be heavy. The MM module optimizes all purchasing processes with work flow driven processing functions, enables supplier evaluation, lowers procurement and warehousing costs with accurate inventory and warehouse management and integrates invoice verification.

It addresses following issues: Economic order quantity, Economic batch run, Fixed period Ordering, Vendor rating.

The sub modules of MM module are

- Pre purchasing activities
- Purchasing
- Vendor Evaluation
- Inventory management
- Invoice verification and Material Inspection

4.1.5 **Human Resource Management (HRM)**

A system which addresses human resource management has to be adaptable to company’s specific requirements and should constantly grow with increasing HR requirements. HR module cover all the functions associated with payroll issues.
It should be flexible enough to allow the firm to optimize business processes by tailoring the ERP solution to suit the organization’s needs. The system should support the organization’s international needs with country specific versions of HR components. Apart from languages, currencies and legal requirements, accounting systems often vary from country to country as well making this a vital feature. A flexible structure enables quick and easy customization of the system to the requirements.

Some of the subsystems offered in this module are

- Personnel management,
- Organizational management,
- Payroll accounting,
- Time management,
- Travel management

4.1.6 Plant Maintenance Management:

Apart from normal production functions, other functions like plant maintenance are also important. It involves breakdown maintenance and preventive maintenance. Though Production module (PM) addresses the production, sequencing and cost control, there are other issues like regular maintenance, reduction in set up time etc., which have to be addressed. The plant maintenance module covers all aspects of plant/equipment and becomes integral to the achievement of process improvement. Some of sub modules are preventive maintenance, equipment tracking, component tracking and plant maintenance calibration tracking.
**Preventive maintenance**: This provides planning, scheduling and control of facilities and equipment. Equipment lubrication, component replacement and safety inspection can be planned. Preventive maintenance lowers the total maintenance costs. It avoids the set up time, down time, machine breakage and process variability.

**Equipment tracking**: In any organization equipment is most important in production process. It should be monitored and protected. Each piece of equipment is defined by a model and serial number. The data sheets can be provided which allow storing the data and grouping the user data. This is in providing useful information for maintenance and transportation control.

**Component tracking**: Components of machine and equipment are very sensitive. Proper monitoring and replacement of components should be undertaken at regular intervals otherwise their failure costs heavily for the entire equipment. Component tracking includes repair/exchange history and component service life.

**Plant maintenance calibration tracking**: This allows the firms to leverage their investment in plant maintenance module for tracking of equipment calibration to support ISO requirements.

### 4.1.7 Quality Management

The firms should satisfy the customers with the products of highest quality. Quality is to be assured not only in final product but also in processes, raw material and service also. This module supports quality planning, quality inspection and quality controls. There are tools like statistical quality control tools and quality charts which used widely in manufacturing organizations. There are X
bar chart, p chart, np chart etc which help the quality inspector to take corrective actions so that quality does not go out of control. Other tools like acceptance sampling, work sampling, six sigma tools are very useful when the production is in large scale. These tools are supported by Quality module.

4.1.8 Other Modules

Apart from the above mentioned modules there are other modules. Each of ERP softwares has its own number of modules. Other modules include Transportation, Education, etc. There are modules which are suited for service sector like hospitals, retail stores, healthcare, banking etc. The service sector is having a lot of potential for ERP software.

4.2 Overview of ERP software market

The ERP market is growing rapidly since a decade. According to Advanced Market Research Company Inc.(AMR) (2012) headquartered at Dusseldorf, Germany, ERP software market growing at a compounded annual growth rate of 40%.

SAP and Oracle account for 38% of the total ERP market as per the report of Forbes\(^{(10)}\). SAP had just over $6 billion in total ERP software revenue in 2012, leading the worldwide market with 24.6% market share. Oracle had $3.12 billion and Sage, $1.5 billion in software revenues for 2012. Oracle’s market share was 12.8%, and Sage, 6.3%. The fig no 4.2 represents worldwide market share of ERP software for 2012.

\(^{(10)}\)www.forbes.com/sites/louiscolumbus/2012-erp-market-share-update-sap-solidifies-market-leadership/
Microsoft increased its revenue from $1 billion in 2011 to $1.1 billion in 2012. Infor increased the sales from $1 billion in 2011 to $1.5 billion in 2012. Their market share increased from 4.2% in 2011 to 6.2% in 2012. There is a new trend emerging with ERP systems called Software as a Service (SaaS). SaaS-based ERP revenues are projected to grow from 12% worldwide in 2013 to 17% in 2017. The report of Gartner’s Market Trends (October 2012) in Table 4.1 shows SaaS Revenue within Enterprise software sizing (percent).

ERP implementation sometimes result in cost overruns and duration overrun depicted Fig no 4.3. As per the ERP report findings\(^{(11)}\) there are 53% of cases of cost overrun and 61% of cases of duration overruns. There are 50% of ERP implementations which result in receiving benefit to the extent of 50% or less.

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Table no 4.1: SaaS revenue within Enterprise software sizing (%)

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Fig no 4.3: ERP report findings (2013)

The organisations going in for ERP implementation set aside a budget for meeting the expenses of ERP implementation (12). It is represented in fig no 4.4

The organisations seek to use the budgeted amount for meeting the expenses of ERP implementation. 35% of ERP implementations take place as per the budgeted expenses. 12% of ERP implementations take place with under budget expenses. 45% of ERP implementations take place with budget overrun and this over run lies in the range of 51% to 75%. 2% of ERP implementations take place with the budget over run and it is above 76%.

4.2.1 SAP

SAP was established in 1972 in Waldorf, Germany\textsuperscript{(13)}. SAP stands for Systems, Applications and Products in Database Processing. It is the leading global provider of client/server business application solutions. Today it has installations in over 107 countries. It is accepted as standard in key industries such as oil, chemicals, automobiles, engineering and electronic industries.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{implementation_costs_erp.png}
\caption{Implementation costs of ERP}
\end{figure}

Earlier version of SAP package was SAP R/2. The new version is SAP R/3. SAP is the most successful vendor of standard business application software and is the fourth largest independent software supplier. SAP R/3 is one of the latest versions introduced to the market. MySAP is another version launched in 2002 and is designed for small and medium enterprises. SAP spends much more on research and development than any other competitor and is likely to introduce new functionality as a result (Davenport 2000).

The important features of SAP software are real time integration, linking a company’s business processes and applications and supporting immediate responses to change throughout through a template on departmental, divisional or global scale. SAP products feature a sophistication and robustness unmatched by other business software solutions. The complete suite of R/3 applications is available in 24 languages including Kanji and other double byte character languages.

Latest technologies such as object orientation are incorporated into the development work and translated into practical customer benefits. SAP R/3 does more than just opening up completely new IT solutions within a company. Its applications also link the business process with those of customers and suppliers to create complete logistic chains covering the entire route from supply to delivery. R/3 lets one to completely integrate nationally and internationally.

Finance and Control module includes Financial Accounting and Controlling. Financial Accounting component complies with international accounting standards such as Generally Accepted Accounting Practices (GAAP).
It fulfils local legal requirements of many countries and reflects fully the legal and accounting changes resulting from European market and currency unification. Although transactions are processed individually, they are integrated with other relevant financial areas. Finance and control module includes General ledger, Accounts receivable, Accounts payable, Fixed Asst Accounting and Legal consolidation.

Along with Financial Accounting another important tool widely used is Controlling which includes overhead cost control, cost centre accounting, overhead orders, activity based costing, cost object controlling, and profitability analysis. Cost and profitability accounting (COPA) tool of SAP plays a major role in analysing the cost centre profitability.

4.2.2 Oracle

Oracle was established in 1977\(^\text{14}\). It is headquartered in redwood Shores, California. It is the world’s second largest software company and the leading supplier of software for enterprise information management. With annual revenues exceeding $12 billion, the company offers database, tools and applications products along with consulting, education and support services. The total workforce at global level is over 50,000. It has operations in over 140 countries. Over 6,000 customers in 76 countries use Oracle Applications. It is the world’s leading supplier of software for information management and decision support tools (Davenport 2000).

Oracle has entered into healthcare segment which is fast growing. Oracle Applications let companies operate in multiple currencies and languages, support local business practices and legal requirements and business critical operations across borders.

Oracle software runs on network computers, personal digital assistants, set top devices, PCs, workstations, minicomputers, mainframes and massively parallel computers. The product Oracle 11i is most sought after in the industry across the globe. Oracle has developed a range of products.

Oracle Applications is the leading provider of packaged and integrated front office and ERP solutions for enterprise and a division of Oracle Corporation. Oracle applications are the only suite of enterprise business applications from an ERP vendor that follows the internet computing model. Each module is web enabled, allowing it to be deployed on corporate internets with no software, other than a browser, required on user’s desktops.

The architecture allows the companies to shift the complexity of application management, maintenance and upgrading from users’ desktops onto centralized systems, thereby dramatically reducing the cost of deploying and administering the software. By minimizing network traffic, this approach also makes it economical to deploy the applications over Wide Area networks (WAN) to a number of users, making it possible to distribute critical business information much more broadly than in the client/server model. Oracle Applications comprises of 45 plus software modules, which are divided a number of categories:
4.2.3 Baan

Baan was established in Netherlands in 1978\(^{(15)}\) by brothers Jan and Paul Baan. It has dual headquarters in Barneveld, Netherlands and Reston USA. Baan is one of leading providers of enterprise business software. Baan offers a component based applications for front office, corporate office and back office automation. Baan company products reduce complexity and costs involved in processes and contribute in improving core business processes.

Baan products which are faster to implement and use are flexible in adapting to changing business scenario and in optimising the management of information throughout the entire value chain. Since 1995 the company has significantly expanded its activities in North America, Latin America, Europe.

Baan’s product line features multi tiered architecture for maximum scalability and flexible configuration. Applications are isolated from the systems environment, enabling support of new hardware, operating systems, databases, networks and user interfaces without any modification to the application code. Baan products support popular Unix and Microsoft platforms. Baan products include Baan(front office), Baan(supply chain ) among others.

**Applications:** Baan applications provide fully integrated, hybrid manufacturing environment, offering applications that address the spectrum of manufacturing scenarios, like make to stock etc make to order etc. Baan comprises many of standard features as in other ERP software.

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Some of BAAN products include:

1. Baan Distribution and manufacturing
2. Baan Finance
3. Baan Service
4. Baan Project

Baan ERP tools consist of a number of components. Baan tools are like a platform that provides an independent flexible, open and distributed computing and development environment. The open architecture tools make it possible to react to new trends in the marketplace that require software. It is develop Baan applications in such a way that they are independent of third party products such as hardware and databases. It is helpful in easily integrating with third party products and creating customer specific solutions.

4.2.4 MFG/PRO from QAD

QAD was founded in 1979 and has presence in over 21 countries\(^{16}\). The company’s products include MFG/PRO, Service/Support management, Decision Support and Qwizard. MFG/PRO’s windows based graphical user interface is an intuitive navigational tool that simplifies the learning process.

MFG/PRO software is a major client/server application as it increases internal efficiency of distributed operations within months of purchase. It is open, comprehensive and available in 26 languages. It can be implemented at multiple sites. Its user interface is Java Browser.

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4.2.5 PC Soft

PC Soft was started in India by Sateesh Jain in 1988. Its solution costs around Rs 30-35 lakh against the MNCs’ Rs 1-2 crore. The company is aiming at SME segment. It has client list of over 700 organisations. It also offers module by module solutions to customers. It has introduced a new extension for advance planning and production scheduling in collaboration with Canada’s Taylor group, which integrates ERP with the plant shop floor. Its customers include Mumbai based ATC tyres and Rs 1000 crore Ahmadabad based Siddhi Gluco Biols.

4.2.6 Ramco Marshal

Ramco Systems, part of the USD 800 million Ramco Group, is a leading IT company focused on consulting, products and managed services business. It was established in 1989 and is headquartered in Chennai with 14 offices spread across India, U.S., Europe, Middle East, and APAC. The company specializes in providing innovative business solutions that can be delivered quickly and cost-effectively in complex environments.

Ramco Systems has amassed over 100,000 users from over 800 customer organisations. The company has over 1,300 employees. It provides solutions to multiple verticals including manufacturing, real estate and construction, energy and utilities, logistics, service, BFSI, aviation, government and defence. Ramco’s collaborative solution-innovation platform – Ramco Virtual Works – ensures the customers that when business changes system also changes with it. Ramco Systems has been certified for ISO 9001:2008 quality standards, and ISO 27001:2005 security standards.
Its customers include both small scale as well as medium scale industries. Some of its clients include Mountain hydraulics, Pearl polymers, SEZ and energy firms. Ramco had developed full fledged ERP solution “On Demand ERP”. It provides fully integrated solutions to customers. Ramco on Demand ERP helps businesses streamline processes from start to finish and enables the firm to execute processes with increased efficiency. Because the solution integrates various processes, the firms can gain critical information across each section and make smart decisions. It has following features:

1. No capital expenditure: It is available on internet on subscription model and requires no additional license. It ensures there is no capital expenditure required to purchase.
2. No additional investment: It does not require additional investment and hence is useful in cost reduction.
3. Scale as you grow: It ensures that customers can subscribe to those functionalities that businessmen requires,
4. Automatic upgrade: Whenever there is upgradation required the team from Ramco will carry out upgradation which will help customers to keep pace with industry requirements.

4.2.7 Other softwares

There are number of other softwares available in the market. Some of them are suited for a particular industry vertical and some of them can be used for particular industry. The implementation of these ERP software depends on the requirement of the firms, the budget and the objectives of the firms. Many of
Financial Implications of ERP Software Implementation in Small and Medium Industries in Karnataka

Software firms have come out with ERP software which are suited with small and medium scale industries. As more and more ERP software are released to the market the users will be benefited and they can be local language to understand the processes. Some of them are mentioned below: Epicor, Sage, Concur, YonYou, Source Pro, Godrej and IFS solution.

4.3 Research Models for ERP

As ERP implementation is followed by some procedures and a framework the firms put in effort to see that implementation is successful. Before the development of ERP software legacy systems were in use as well as structured systems. There has been development of information system to suit the needs of business organisations. For successful implementation many models are proposed. These models are information system models which have been developed along with development of computer software and technology. The notable models among them are Technology Acceptance model and DeLoe and Mc Lean information system success model.

4.3.1 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) was adopted by Davis (1986) after adapting the Theory of Reasoned Action (TRA), specifically modified for modeling user acceptance of information systems. The aim of TAM is to analyse the determinants of computer acceptance related to user behavior across a broad range of end-user computing technologies and user population. In addition, TAM provides a framework for tracing the impact of external variables on internal.
beliefs, attitudes and intentions. TAM was formulated in an attempt to achieve these goals by identifying a small number of primary variables suggested by previous research dealing with the cognitive and effective determinants of information system acceptance and using TRA as a theoretical background for modeling the theoretical relationships among these variables.

In this model perceived usefulness and perceived ease of use are of primary relevance for acceptance behavior as shown in figure no 4.5. Perceived usefulness is defined as the prospective user's subjective probability of increase in his or her job performance using a specific information system within an organization.

**Fig 4.5: Technology Acceptance Model**

Users of information system usually perceive some benefits from the implementation of information system. If using of the information system becomes difficult or if the users don’t know how to use the information system the very purpose of information system cannot be fulfilled.

Perceived ease of use indicates the extent to which the prospective user expects the target system to be free of effort. TAM proposes that external
variables indirectly affect attitude toward using, which finally leads to actual system use by influencing perceived usefulness and perceived ease of use. Legris et al. (2003) indicated all the relations among the elements of TAM had been validated through many empirical studies. The tools used with TAM have proven to be of quality and yield statistically reliable results (Legris et al. 2003). There is another theory called Theory of Reasoned Action (TRA). The main difference between TRA and TAM is the absence of subjective norm in TAM. Subjective norm is defined as “the person's perception that most people who are important to him think he should or should not perform the behavior in question” (Fishbein and Ajzen 1975). Davis (1986) did not include the variable subjective norms in TAM because of its uncertain theoretical and psychometric status and negligible effect on perceived usefulness and ease of use.

However, Hartwick and Barki (1994) identified a mixed finding about subjective norm: After separating their respondents into voluntary and mandatory use contexts, they found that subjective norm had a significant impact on intention in mandatory system use but not in voluntary settings (Hartwick and Barki 2001).

For this reason, the updated TAM, also called TAM2, extended the original TAM by including subjective norm as an additional predictor of intention in the case of mandatory system use. Furthermore, TAM2 incorporated additional theoretical constructs including social influence processes and cognitive instrumental processes. The causal relationships and elements of TAM2 are described in fig no: 4.6 (Venkatesh and Davis 2000).
4.3.2 DeLone and Mc Lean IS success Model (DM Model)

In recognition of the importance in defining the IS dependent variables and IS success measures, DeLone and McLean proposed a taxonomy and an interactive model as a framework for organizing the concept of IS success. They defined six major dimensions of IS success – System Quality, Information Quality, Use, User Satisfaction, Individual Impact and Organizational Impact.

DeLone & McLean’s IS Success Model (D&M IS Success Model), as shown in Figure no: 4.7 deals with both process and causal consideration. These six dimensions in the model are proposed to be interrelated rather than independent.
These dimensions are defined as follows (DeLone and McLean 1992):

1) System Quality - the measure of the information processing system,
2) Information Quality - the measure of information system output,
3) Use - the recipient consumption in the output of an information system,
4) User Satisfaction - the recipient response to the use of the output of an information system,
5) Individual Impact - the measure of the effect of information on the behavior of the recipient, and
6) Organizational Impact - the measure of the effect of information on organizational performance.

Until 2003, the association among the measures in D&M IS Success Model had been tested by 16 different empirical studies. The results of these studies validated the causal structure of the D&M IS Success Model. Considering the
reviews of their original model from the empirical studies, DeLone and McLean established the Updated D&M IS Success Model as shown in Figure 4.8 (DeLone and McLean 2003).

**Fig no 4.8: Updated DeLone and McLean IS success Model**

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**4.4 ERP for manufacturing industries**

Some of the large scale industries which have implemented ERP in India include Oil and Natural Gas Corporation (ONGC), Indian Oil (IOC), Ranbaxy, Bajaj Auto Ltd, Hero Honda, ICI India Ltd, Toyota Kirloskar Motors Pvt Ltd. etc.

These firms have achieved economy of scale, significant market share, well established market and growth potential. As their sales turnover exceeds Rs 500 crore and assets size in hundreds or thousands of crores of rupees, heavy investment in ERP software is justified. Many of ERP softwares vendors have implemented their ERP software in the above mentioned companies. Apart from manufacturing firms those in service sector are also going in for ERP software.
They include hospitals, retail chains, transport organisations, educational institutions. Financial intuitions are also implementing ERP software.

4.4.1 ERP for Small and Medium Businesses

The large scale industries are able to afford ERP software in order to have the growth, profitability and market share. Equally important are small and medium industries in the growth of economy. In India top most 500 companies have already implemented ERP. It makes the SMBs the next logical adopters. It is seen that the spending by SMBs on information technology (IT) is expected to exceed IT spending by large enterprises within few years. Especially in emerging economy like India small and medium industries are having huge potential for growth and profit.

As the players in small and medium businesses are having less sales turnover and less market share they have to concentrate on the minimization of cost while adopting ERP software. Also they have to look into other factors to achieve their objectives.

The main factors that are considered by small and medium industries while implementing ERP software are briefly summarized as follows:

1. Cost of ERP software, hardware and architecture
2. Suitability of ERP software with the nature of business processes
3. Increasing market share of the firm
4. Cost of training workforce to work on ERP
5. The sales growth potential of the firm
6. Up gradation to higher versions post implementation
7. **Shortened period of implementation cycle**

In view of the above mentioned factors many ERP softwares are being introduced by the ERP vendors. Some of the products are launched by the ERP vendors for SMBs.

SAP has launched a product called “my SAP all-in-one” in 2003. It has the advantage of taking only 6-8 weeks for implementation. SAP has released a product “SAP Business One” in January 2006. It is a software tool that was developed exclusively for small businesses in India.

After Oracle acquired PeopleSoft in 2004 it has strengthened its product portfolio and configuration of the products for different industry segments. Oracle has its suites like Oracle financials 11i, manufacturing etc. First Logic in India has come out with its own ERP suite tailor-made to customer’s requirement. It is targeting small enterprises to make inroads into the ERP market.

Likewise the potential exists for banking and financial services sectors to integrate their branch and overseas offices. Infosys has developed Finacle core banking solution for banking industries. I-Flex has developed Flex cube for banking industry.

### 4.4.2 Open source ERP in SMEs

Open source refers to directly reproducing ERP software using any available ERP at very lower cost or without paying license fees. Many features of ERP software available in any other ERP software can be incorporated into the Open source ERP software. Open source ERP software is helpful to many SMEs to implement ERP software without the need to invest much on IT. The SMEs are
Financial Implications of ERP Software Implementation in Small and Medium Industries in Karnataka

being benefited in their growth. “Compare” is one such ERP which has been popular in open source ERPs.

4.4.3 Tiers in SMEs

SMEs are divided into four categories called tiers depending upon investment and resources as well as their inclination for IT implementation strategy. Tier1 SMEs give greater emphasis on IT strategy and implementation. They consider IT solutions as part of company’s strategies and seek faster growth. Tier 1 SMBs are few and form less percentage of total SMB space.

Tier 2 SMBs use lesser amount of resources and are likely to enter into deal with resellers of ERP software. Tier 3 SMBs are those which strive hard to control unnecessary expenditure and purchase directly from internet/mail order resellers. They have smaller budget. Tier 4 SMBs includes those firms which find it much necessary to implement ERP because of pressure from customers and suppliers. They prefer regional and national level vendors.

4.4.4 Approaches to ERP implementation

Different firms follow different approaches for ERP implementation, each of which has its own advantages and disadvantages. There are two approaches namely Big bang and Roll out (17). In Big Bang approach, a firm goes for implementing all ERP modules at a time in all locations. This is a common approach for SSIs for implementing ERP in one or two locations.

However, this is not very common in case of large ERP implementations running across several plants and having several modules. Advantage of this approach is that it reduces total implementation time and related cost.

There is also disadvantage of high risk failure. Besides, it demands time and effort from a lot of senior personnel in the organization at the same time and therefore for most firms it becomes difficult to run the business after deploying so many senior people for ERP project. It is not a recommended approach for large scale implementations.

In Rollout approach, a firm first goes for ERP implementation in one plant for all the modules. This location is a representative one, having good representation of the company’s all business process and this is the place where company builds the global template that covers most of the company process. Later this template is replicated to several locations. An example of this can be a multinational company which goes for its first implementation in a country ABC and XYZ, while most process parts are common. ABC specific sales tax, accounting and duties would be added to the template i.e. the template needs to be localized. Rollout can also be based on different businesses or divisions of a company. The advantage of rollout approach is low risk and it does not put lot of pressure on the company in terms of time. However the only disadvantage is that project may go on for long time.

Other approach like Big bang and Modular is also used by firms to implement ERP software. In Big bang and Modular approach, a firm wants to go live for all plants but for selected modules.
The firm may decide that in the first stage a basic transaction system is to be deployed and therefore it would implement financial, material management and sales modules. Later on it will go for other modules like plant maintenance, production management, human resource etc. for all plants.

In Rollout and Modular approach, a firm takes a template rollout approach as described earlier, but first the basic requirements are implemented in one plant and then rolled out to other plants. Next, the company upgrades the template with more functionality and then again starts rolling out template in all other locations.

This approach gives lots of scope for learning from earlier implementation and is better in terms of change management. The only drawback here is that more time is needed to complete the implementation.

Different types of ERP projects are

1. **ERP implementation projects**: These are classic ERP projects implementing an ERP solution for the first time in a company.

2. **ERP upgradadation projects**: Existing ERP customers need to upgrade to the next version of ERP for better function and/or when the application vendor denies supporting older version of ERP or agrees to support a much higher annual charge.

3. **ERP global rollout projects**: A multinational company having operations in different countries or a company having different businesses may adopt this approach. In this case, based on common requirements of different countries/businesses a global template is created which is then rolled out in different countries after adding country specific enhancements. This ensures commonality of process which are central and still providing local flavor as and where needed.
This also reduces project risk (as most of countries the solution is tested and working in some other country.) and overall project cost.

4. **ERP migration projects:** These are the cases where a customer who is on a particular ERP wants to migrate to another. In the past many companies which were on JD Edwards or PeopleSoft had migrated to other softwares as those companies were taken over and no new functionality enhancements were available in their existing ERPs. Some customers of these ERP even had problem in getting proper support. For a pure migration project from a client’s perspective, there is no business benefit expected as exactly similar process needs to migrate to a different environment.

5. **ERP harmonization/consolidation project:** These are the cases when a company has different ERP instances for different countries/businesses and wants to consolidate these into one to reduce total cost of operations.

   As there are different types of ERP projects, the same methodology may not suit every type. So, package vendors and consulting companies came out with several versions of methodology to suit specific type of project requirement. For example, SAP came up with a separate ASAP methodology version for upgrade and global projects. SAP also has a methodology for application support known as Run SAP.

   Implementation of ERP is a strategic decision. It involves commitment of top management and consultants. ERP provides up to date information and enables decision makers to take right decisions in reducing the cost and improving the quality. The implementation involves some difficulties. The implementation
should be justified. It involves heavy expenditure to the tune of millions of dollars.

The implementation cost includes the cost of software, hardware and training the necessary workforce required to work on the system.

The implementation takes some months to few years depending upon the nature of business, branches (sites) to be integrated, national or international sites to be covered, etc. The heavy industries in manufacturing sector find it affordable to integrate at national or global level because of the economy of scale it offers.

Broadly the steps involved in a total ERP implementation are as follows:

1. Identification of the needs for implementing ERP package
2. Evaluating “as is” situation for business
3. Deciding about the would be situation for the business
4. Reengineering of business processes to achieve the desired results
5. Evaluation of the various ERP packages
6. Finalisation of the ERP packages
7. Finalising the implementation consultants
8. Implementation of the ERP package

Some of the large scale industries which have implemented ERP in India have achieved economy of scale, significant market share. As their sales turnover and assets size are in billions of rupees, heavy investment in ERP software is justified. Successful implementation of ERP is the obvious goal of any organisation that chooses to go in for implementation. Given the kind of complexity coupled with time constraints that are inherent in almost all such projects the risks involved are considerable.
4.4.5 Business Process Reengineering

Business Process Reengineering (BPRE) is radical transition that companies must make to keep pace with ever changing global markets. BPRE makes companies more customer oriented and responsive to the changes taking place in market conditions. BPRE is a rethinking process that helps to improve process speed, quality and output of materials and services.

Over the years competition and the increased customer focus have undermined importance of economy of scale. The relation between customer and company is no longer is restricted to selling and buying. It encompasses business activities, consulting and pricing. Earlier information technology was used in automation process reducing manual work and time.

Now information technology is being used not only for automation, but to redefine the processes, changes and development. Today IT and BPRE are being used simultaneously. BPRE team tries to maximize and streamline processes and assess whether they should be changed or perhaps thrown out.

4.4.6 Post implementation options

After implementation of ERP the firms concentrate whether workforce is inclined to use ERP systematically or as per guidelines issued or there is a tendency to roll back to old practices. Initially the employees who are not so computer literate may find it difficult to adopt new system. There should be a constant monitoring on the employees and they should be motivated to use all features of ERP as and when need arises. On the monetary front return on investment (RoI) should also be expected.
Usually firms have expectation on return on investment (RoI) on ERP. There is no such industry standard available to compare with the expected RoI. Employees after having been trained on ERP may quit for better prospects. If they quit there will be difficulties in day to day operations. So alternative options should be explored so that the attrition rate has minimal effect. Process optimization and thus performance improvement are a continuous exercise.

4.4.7 Case studies

Case study 1 ERP implementation in Madura Garments (17)

Madura Garments is a part of Lalbhai group. It is one of India’s fastest growing branded apparel companies based out of Bangalore with a turnover of Rs 400 crore. It produces and sells the reputed brands such as Louis Philippe, Van Heusen and Allen Solly. It has eight 8 factories, a warehouse, over 120 exclusive showrooms, 15 agents, 22 distributors and 3500 retail outlets spread across the country.

It is operating in an environment where competition is stiff, margins are under pressure, showrooms and retailers are to be constantly monitored and integrated with the supply chain. The garment units are to be sold in 6 to 8 weeks, otherwise whatever was left had to be cleared at discount up to 50%. It was critical that Madura had complete visibility into the supply chain and wanted improve its efficiency.

It also needed more forecasting, better matching of demand and production, smoother interface with distributors and retailers. It needed to wire up everything—production, forecasting, and distribution smartly. Madura needed ERP and other applications on top of it to reduce lead times and better response mechanisms.

The company after having analysed various ERP softwares adopted SAP. It decided to go for industry and inventory specific solution called Apparel and Footwear Solution (AFS) comprising SAP R/3 and AF3. Madura formed a project team comprising a consultant from PwC and hired a team of 5 programmers and trained in ABAP (programming language). The team developed barcode scanning module—a software that would collect and load data automatically into the ERP system from barcode scanner. Then the team integrated Web-based ordering process with the ERP system. Also it went integrating top management MIS so that it could cull out data and present it to the bosses faster and accurately than ever before. While implementing ERP Madura has set milestones—when a module such as MM was implemented it insisted that SAP AG fly an expert from its headquarters in Germany for auditing milestone. Only after the audit did they move to the next stage. As a result Madura was able to stabilize the system within 12 months.

Profitability assessment for each showroom, brand and customer can be done in the system. The new system can also suggest replenishment based on these parameters and also generate weekly control reports on sales and inventory for each showroom. The overall effect of ERP implementation can be put as follows:
After ERP implementation order fulfillment has increased from 70% to 90%. Average receivables decreased from 55 days to 45 days and average unsold stock decreased from 55% to 10%.

Case study 2: Shanti Iron and Steels Private Limited Belgaum

Shanti Iron and Steels Pvt Ltd. is a small scale unit located in Belgaum. It was started in 1971. The firm produces automobile components for major automobile companied in India. The firm has foundry facility, heat treatment plant and number of machine tools to carry out turning, drilling, milling and finishing for the components. Its customers now include New Holland, Edison and Co Limited, Chennai, Kirloskar Oil Engines Limited Pune, Atlas Copco Pune etc. It procures raw material and some components from local suppliers located in Udyambag industrial estate as well as from other cities.

Earlier it used to draw production plan manually based on the demand from customers. It used to procure raw material from local sources. There was no need felt to use software for the firm. Functions of billing and payroll etc were handled by the accounts department personnel. As the scale of activities increased there was a need felt to use computer software which would meet the requirements of production and material management.

The firm initially went in for Brain ERP software which was developed keeping in view of the requirement of the firm. But with the rising demand the firm’s scale of activities increased and increasing workforce the existing software could not handle all the issues. The management thought of going for ERP software. The management after consultations zeroed in on Godrej software 9.2
software. The staff from Godrej ERP software came to Belgaum and studied the processes, workflow model, responsibilities of the staff at different levels and procurement pattern of raw materials. They studied for one month. They designed the software for Shanti Iron and Steel keeping in mind the regulations of State and Central government. The implementation was started in 2007. The major modules like material, production, finance and control, sales and distribution were implemented. The new Godrej 9.2 ERP software was implemented. The total investment was Rs 17 lac. The firm expected recovery period of investment in ERP is about 3 years.

When the researcher during data collection asked Ajith Kumar, the works manager about why the firm did not go for implementing branded ERP software like SAP or Oracle, he said “As Godrej software meets our requirement we don’t have any problems. Moreover it very user friendly. Godrej software has provided satisfactory results. There were trials and errors in beginning. Over the years It has become easy to use and understand better”.

The software is useful in preparing the production plan, preparing balance sheet. Material department can quickly raise purchase orders using template. The firm has recorded increase in sales revenue and profitability. Also lead time in procuring raw materials has come down. The level of utilizing capacity of machines has also increased.
Case study 3: Ravi Enterprises Bangalore

Ravi Enterprises Pvt Limited is a small scale unit located in Kamakshipalya industrial estate in Bangalore. The firm was started in 1996 and it produces components for hydraulic jacks and general purpose machines for other industries. Its turnover is less than Rs 10 million per year and employs six workers. Many of its workers are illiterate and have experience of over 5 years.

The production plan was done manually and also the materials were purchased after raising purchase orders. Many of customers were located in Bangalore. Sometimes an order would come from a customer and the production would be carried out as per design specification and supplied to the third party located in some other area. If there were any defects in product or mistake in billing issues it would pose difficulties for coordination. Only the managing partner would know status of the order delivery schedule. The firm found it difficult to handle all these activities. It decided to go in for software. As the branded softwares were too costly for the firm it thought of going in for SMART software.

Ravi Kulkarni, the managing partner of the firm thought of going in for two modules—production management module (PM) and material management (MM). Production module would address all the basic issues related with production and the material module would address the issues involved in procuring materials and components. When the researcher asked why only two modules were implemented Ravi Kulkarni replied that the two modules served the needs of the firm. The SMART software was implemented in 2009 at a total cost of Rs two
lakh. The SMART software with production and material modules was implemented. Now the firm is able to procure raw material and manage its inventory. It is able to take up production plan with fewer errors. The different components and machines required by the customers can be supplied in less time. The firm is able to utilize its capacity more effectively. The workers who are semi literate do not have difficulty in understanding the software. The firm is thinking of going in for other modules to derive benefits from ERP.

It is seen from the above case studies that the firms have benefited from implementation of ERP software. Of the above three firms Madura garments is a large scale firm and the other two are small scale firms. The employees find it easy to use ERP software for day to day operations.

Order fulfillment has increased from 70% to 90% for Madura Garments after implementation of ERP software. And average receivables decreased from 55 to 45 days. In Shanti Iron and Steels Pvt. Ltd. the ERP software is useful in preparing the production plan and balance sheet. In Ravi enterprises only two modules-material management and production management are implemented. The firm has invested less on SMART ERP software. It is able to reduce errors in operations and utilize its capacity to the maximum extent. All the firms have recorded increase in sales revenue and profitability. Also the lead time in procuring raw materials has come down.