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## Development of Enterprise Resource Planning (ERP) System

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### *Abstract*

*Through this paper an attempt is made to understand the various phases of ERP evolution. The objective of the present paper is to understand the concepts of ERP and undertake the empirical research on ERP and Supply Chain Management. Secondary source taken as base for developing the present paper. It is found that there are three phases of development it includes phase one Material Resource Planning (MRP), in the second phase Manufacturing Resource Planning (Mfg.RP) and in the third phase it is Enterprise Resource Planning (ERP).*

**Key words** - Material Resource Planning, Manufacturing Resource Planning and Enterprise Resource Planning.

### **An overview**

The development of ERP system dates back to 1960s where the main focus was on inventory management system. Inventory management was the biggest concern for the organizations as it helped to continue with the production in the factory. But the system had its own limitations. One of the major limitations was unnecessary cost of maintaining raw materials when the demands of the final goods were low. This was for the first time, a need raised to develop a computerized system which can predict the future demand of both raw materials as well as finished goods. Based on the past records if a system can be developed then it would help the organization. The system is also able to reduce the cost of operations of the organizations as well. This need first time bring a system named as Material Requirement Planning (MRP). The objective was to plan to product and part requirements as per the master planning schedule. This computerized model was developed in the year 1970s and this became the first model which was used to determine the inventory level as per the production planning. During the 1980s, the existing system was developed and new software was introduced in the name of MRP II. This improvised version helped to improvise the manufacturing processes by mixing the raw materials with the production requirements. Some of the important

dimensions which were added in the MRP II software were human resource management, project management, financial management; inventory management and most importantly shop floor availability where production was suppose to take place. These dimensions helped to integrate the resources that the organization had to use it in an effective manner. During late 1980s, the organizations demanded more improvements in the existing system and ERP was introduced in the market with value added facilities. Probably for the first time entire organization's various departments and productive activities are integrated under one system and each and every departments got access to reliable data or informations to use it for developmental and productive purposes. The ERP producers are keep on adding more and more modules so as to provide more value added services to its target customers. A detailed study of each of these segments will be given in the subsequent part of the thesis.

### **Objectives of the study**

To understand the various phases of development of ERP

To undertake the empirical research on ERP and Supply Chain Management (SCM)

### **Methodology of the study**

The secondary data is considered for the present study.

### **Phases of Development**

#### **Phase I: Material Resource Planning (Early 1960s to 1970s)**

The concept of MRP was introduced as part of material planning. Previous method of material requirement was manual in nature and sometimes it was delayed the entire production process. The developers of MRP were looking for a better solution which may give more sophisticated result in terms of material planning. The software supported the creation of and maintenance of material supported data across one or more organizations where production activities are going on. The system was capable to do the demand based planning as well as consumption based planning. Demand based planning is basically a byproduct of consumption based planning. Over the years, the organization has the idea about its yearly consumption of products or materials which can be utilized to develop a more comprehensive system to predict future demand. It basically helped to provide data in an efficient manner so as to predict the future demand. This kind of demand forecasting model was never used by the organization. The existing manual system failed to predict the future outcome in efficient manner. The system was able to analyse a big data to get specific outcome. Since ERP was based on material requirement planning certain basic informations needed to be answered. At the beginning it is important to identify the materials or products which the organization is planning to make. But only identification of the potential product is not sufficient, it should be linked with the raw material requirements. The availability of raw materials and procurement of raw materials are two essential things which should be addressed by the organizations at the beginning. At the third stage the organization should judge their internal resources to produce the products. Any organization needs various resources to produce a product. On the one hand it needs manpower or human resources; on

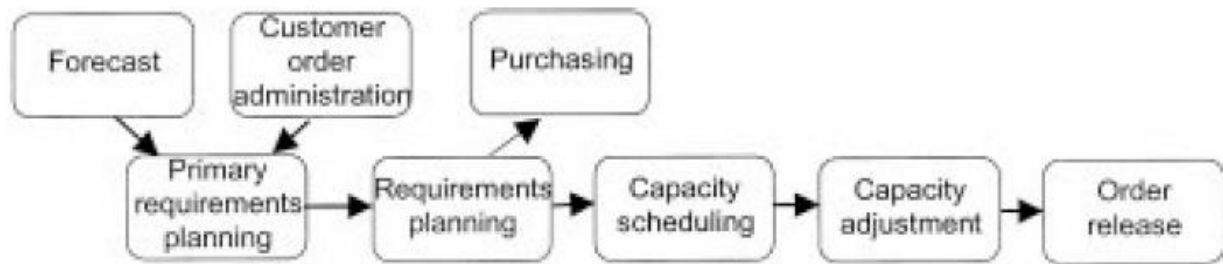
the other hand it needs machines or capital equipment to produce the products. If the internal capacity is not judged adequately, it will fail to meet the specific requirement of products or services that they have decided to produce. Lastly the organization should address the gap that they are facing to produce the products or services. The gap may come from the supply side, production side, distribution side or from the customer's understanding about the products or services as well. If there exists any gap and if it is not addressed properly, then down the line this will become threat of the organization. So, it is important to address the issues at the beginning. These steps are universal in nature and will remain as it is irrespective of the type of the organization where they are operating. The future requirement is essential to understand the nature of the market and changing behaviour of the consumers. Thus MRP process was the first comprehensive software system which was able to address the issues related to production planning.

### **Phase II: Manufacturing Resource Planning II (1970s to 1980)**

The use of MRP package had seen improvements after the introduction of new version termed as Manufacturing Resource Planning (MRP II) and to differentiate it from the previous MRP, it was introduced in the name of MRP II. The main function of this system was introduction of forecasting model. This was the first time a computer based model was developed which was more effective than the previous model as it had the capacity to predict the future demand. The module had the ability to analyse the demand based as well as consumption based planning methods. In addition it was also used the available stocks into account to predict the future outcome. So, basically this system was able add three value added services as compared to previous MRP module. These are sales and operations planning, financial planning and simulation planning. Sales and operations management is one of the important parts in any organization and most of them try to achieve best performance here. Sales part has the data regarding demand and supply of raw materials as well as the finished goods. These data till date were not analysed properly to predict the future demand for the products or services. The future prediction of the market surely affects the market conditions and business opportunities. The volume of sales has a direct impact on the operations management of the organization. Production and operation is the key component which has a direct link with the sales of the organization. But production cannot be increased all of a sudden. It must have a proper planning and this module was for the first time able to incorporate this facility. The second in line was creation of financial system which can translate every piece and materials in terms of monetary units. Only having physical quantities has no meaning unless and until the organization is able to judge the value in terms of monetary aspect. The objective was to get an idea about financial requirements that the organization may have. This system will help to create required budget as per the need. Every organization must have a proper planning to arrange the funds necessary for future investment. Funds can be generated through own capital or through equity investment or through bank loan in the form of debt. Unless and until necessary arrangements are not made it becomes difficult to survive in the competitive environment. The module thus developed an in build system to deal with this issue. Thirdly, the

system was able to incorporate simulation technique which has the ability to design actionable things necessary for the organizations. These actionable should be measurable in terms of specific units or currency.

**Figure 1.1. Production Planning within MRP II**



*Source: Helmut Klaus, Michael Rosemann and Guy G. Gable, Information Systems Frontiers 2:2, 141 - 162, 2000, pp 145*

So MRP II was a software system aimed to address both operational planning as well as financial planning. The operational planning is measured in terms of units but the financial planning is measured in terms of monetary units. Along with these two broad objectives the system has the capacity to incorporate other important functions like, business planning, sales and operations planning, production planning, material requirement planning, capacity requirement planning and so on. The combination of these creates a system which was termed as MRP II.

### **Phase III: 1980s Onward – Enterprise Resource Planning (ERP)**

ERP software can be termed as an improvised version of MRP II software. The system was developed to provide all out solutions to each and every organizational problems. The basic objective of the ERP module is to create high end customer solutions, reduced cost of production, improved productivity, better inventory management and creation of effective supply chain management system. The improvement of information technology also helped a lot to uplift the system software by adding different modules in the main system. Basically the system is able to develop end to end solution by incorporating customers, suppliers and supply chain management system. As ERP is evolved it started giving a very high level of effectiveness in terms of improved production and efficiency. Since, the organizations are got to know the benefits it can use the existing resources to the fullest possible way. It is also able to give a foundation on the basis of which additional value added services may be generated. The entire system is developed in such a manner so that other modules may be added with the core software for a better result. In most of the organizations, keeping additional inventory is often problematic as it will increase the cost unnecessarily. The inbuilt forecasting system may help to improve the future decision making process. ERP system does not provide a detailed idea about materials and production schedules. It has other dimensions as well. On the one hand it has the facility to incorporate customer feedback, delivery of goods and services to end customers, on the other hand, it is also helped to determine or identify the equipment requirement to deal with the production, requirement of need for product development. Most importantly, the services also helped to calculate

the cash flow and profit. The evaluation of ERP system has seen many changes. Initially it was started as an integrated module to take care of various departments of the organizations like, human resource, inventory management, order and procurement, scheduling, financial aspects, materials management and so on. The system was able to generate a large number of data set to get some meaningful solution of the problems. Before the system was adopted by the organizations, the same set of data did not produce any specific information as they were not captured properly. The organizational environment failed to predict the future outcome from any kind of productive activities as well. Later on some more modules are added to the core system and an extended ERP concept has been introduced in the market. These extended parts basically cover advance planning and scheduling and e – business solutions like Customer Relationship Management (CRM) and SCM. The last two models have significant impact on the present day business system. The significant improvement in mobile internet also forced the organizations to adopt the changes to maintain the customer relationship strong. The figure 1.2 shows the evaluation of ERP system in a phased manner.

**Figure 1.2. ERP Evaluation in a Phased Manner**



*Source: Enterprise Resource Planning: Global Opportunities & Challenges, by Liaquat Hossain, Jon David Patrick and M.A. Rashid, ISBN: 193070836x, Idea Group Publishing, pp 18*

It can be seen that the concept was first introduced during the year 1960s to deal with the inventory related issues as that was the main problem during that time frame. The main emphasis was to create an inventory control packages which could have been more beneficial than manual order. The system was continued till 1970s when it was replaced by MRP. It was a more improvised version than the previous one. In this system materials and production requirements both were adopted. In the 3<sup>rd</sup> phase MRP II came into picture and actually this was the beginning phase of ERP. Material requirement planning was transformed into manufacturing resources planning. Under this module, not only the goods and materials focus was given to the availability and purchase of raw materials as well. But the module was not that much effective with the changing business environment. So the drawbacks were identified and a new module was conceptualized during the year 1980s. ERP was the

first comprehensive system which was able to integrate all the internal resources of the organizations in an effective manner. It was also able to plan the production schedule and quantify the resources as per the need of the organizations. Transformation of resources into quantitative term helped to identify the revenue generation mechanism. The integration of all the departments all helped to fetch the required data as and when the organization was looking for it. But with the advancement in information technology the need of the ERP system was further modified. For the first time the system was able to integrate services other than material and inventory management. This service was termed as Extended ERP system. The main emphasis was customer relationship management and e – commerce business. The adoption of supply chain management is also there. The extended system is able to develop a module which incorporates all the fields necessary to run any kind of business organizations.

### **Concluding observation**

The observation made through this paper is that in the early sixties belongs to inventory control packaging era followed by in 1970s it was the era of material requirement planning similarly the 1980s period belongs to manufacturing resource planning (MPR-II) , in 1990s the period belongs to Enterprise Resource Planning and finally the 21<sup>st</sup> century belongs to extended ERP era. In this era role of ERP plays an important role and it helps the organization for better delivery of services and transparency in the transactions.

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