

DEVELOPMENT AND APPLICATION OF SYSTEMS FOR RESOURCE PLANNING ERP/ASP

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Summary: Planning of resources in enterprises maintains all internal processes, as it provides the opportunity to follow up and analyze engineering, human resources, production, delivery chain, accounting. Important aspect is the personal-configuration of own business rules in the software.

KEYWORDS: SYSTEMS FOR PLANNING, DEVELOPMENT OF ERP, OPERATION OF PLANNING.

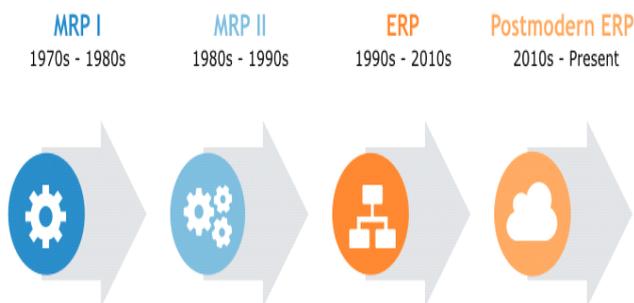
1. Introduction

The term ERP is introduced, as a notion for Material Resource Planning (MRP), and later developed material resource planning in production (MRP II) is for production with integrated computer systems. ERP is more comprehensive, reflecting the evolution of systems for planning.

By the mid-nineties, ERP systems already integrated all basic functions in the enterprise. Also, big non-profit corporations, governments and organizations started using the ERP systems.

2. Development of ERP. Functionality.

The term Enterprise Resources Planning (ERP) is used by the company Gartner Group dealing with research of the IT market for managing systems, fig.2.9.



"ERP II or ERP postmodern" is introduced in the beginning of XXI century. It represents web-based software, which offers access in real time to the ERP system itself for employees and partners, like providers and clients. The role of ERP II expands optimization of the resources and processes used in the traditional ERP systems. Instead of just managing purchases, sales and so on, ERP II takes the information of the resources under its own control to help interaction of the enterprise with other enterprises.

Today, the automated ERP systems, driven to a large extent by mobile-adapted applications and related services pass through a particular market segment, and collect data where and when new information emerges within the company's customer base.

ERP systems support dynamic technological processes which are necessary for flexible production. Internet access allows direct communication of the ERP system with the cyber-physical systems and intelligent products at a production level. By using of in-memory databases for big quantities of data, the sensors of CPS can process information in real time. This way if any changes occur in the production, the software produces simulation with the help of the in-memory technology in real time. Production processes can now be optimized faster and better. Direct access of the production

data from the ERP system ensures transparency of technological and business processes for individual orders. These decisions are easier to perform because the simulations and forecasts (which are created by the ERP system) are presented in a handy way on mobile devices such as smartphones and tablets.

Companies can use a new generation ERP system that is suitable for use in environmental conditions such as ЧИП. This is an intelligent ERP system that uses service-oriented architecture (SOA). Therefore, services and functions of other software providers can be used through standardized interfaces. In addition, ERP system uses the Cloud Computing capabilities of Internet Service Access (IOS). This part of the internet includes services and features that run as web-based software components.

Productional planning with APS systems

From the perspective of the accuracy of production planning, systems of class APS (Advanced Planning and Scheduling) are definitely of interest. APS systems come to life in mid-nineties of the XX century. They are vehicle for true planning of the activity of an industrial enterprise. These systems allow productional planning to be: solved and developed; operational; synchronic; accurate and optimized.

Soon after the first attempts to use ERP systems for production planning, the advantages and drawbacks of planning based on MRP II standard, including management methodology for manufacturing enterprises, production capacity planning and material needs, are clear. The requirements of systems supporting this standard are defined by 'The Association for Operations Management APICS'.

Disadvantages are a many, one of the problems is the main one - adequacy and accuracy of time planning. The turbulence of the markets, the promotion of the "Right in Time - JIT" concept and others, require very precise delivery times and much more active participation in the supply chain.

In this aspect, MRP II planning does not meet the requirements. Priorities in production planning have to be retaught. It becomes clear that productional planning without supply chain management (SCM), without the possibility of forecasting the exact moment for delivery of outputs, cannot help to achieve high competitiveness and sustainable development of the organization.

This is also the main goal of the new generation of production planning systems. APS systems are systems to solve a number of supply chain management tasks (SCM). This new functionality, which is achieved at the expense of the ability to plan all activities over time, taking into account the load of production capacities, has two aspects. On one hand, it refers to the entire industrial enterprise as a level of the dynamic supply chain, and on the other – the units of the industrial plant itself – workshops, plots, work centers.

Thus, planning capabilities with APS systems have been significantly expanded and improved compared to MRP II planning.

Synchronization of planning

For APS systems, sync should be seen in two directions. On one hand, synchronicity is seen as an opportunity for simultaneous material planning and, together with this, for the preparation of a calendar plan that takes into account the load and time. On the other hand, synergy is that the calendar plans are build for all organizational units, taking into account the delivery times of suppliers, sub-contractors, outsourcers and others. The calendar plans for these units are independent of time, because they are in fact derived from the overall calendar business activities of the enterprise as a whole.

Operation of planning

The planning functionality with APS systems is based on the ability to determine the deadline for completing each order as soon as possible. The operability of timing calculations in the APS systems has nothing to do with the operability of the dispatching control plan (generated by the so-called MES systems) because if no actual data is reported about occurring limitations (breach of supply deadlines by the business partners, unforeseen interruptions, changes in the list of client orders, etc.), pre-planning will not have a real effect. In addition, reporting of internal disruptions from other organizational units (equipment defects, scrapping of products, etc.) significantly extends the dispatching activity and complicates its planning.

By simplifying the calendar planning algorithms, APS developers make it possible, within the available computer power in enterprises, to generate calendar schedules easily and quickly, although it is not possible to accurately predict delivery times for finished products.

In addition, APS systems do not pose complicated tasks such as minimizing times for reset which are included in the calendar plans; times for transport operations; to minimize the number of operating equipment, etc., this is because the reporting of these requirements will inevitably complicate the algorithms and will make it impossible to generate large-scale calendar plans within a short timeframe. This is the main reason APS systems use very short lists of planning restrictions. Although all APS systems are able to pre-plan the calendar plans when new restrictions arise, not all have dispatching modules.

The new planning capabilities of APS systems, driven by the need to manage supply chains, are the main factor in the avalanche growth of demand in APS systems. Currently, the pace of demand for APS systems outpaces the demand for ERP systems. However, it should not be considered that APS systems will displace ERP systems because they do not cover activities such as: finance; supply; document turnover, nor with the registration of the business operations (transactions) of the organizations.

Today ERP developers react very quickly and provide the means to integrate their systems with the APS system. Integration is at the level of the "Production Planning" module in the ERP system. Typically, this module is supplemented or replaced with an APS system.

Modern ERP systems include the following modules:

- Customer Relationship Management;
- Manufacturing and Engineering;
- Human Resource Management;
- Asset Lifecycle Management;
- Order Management;
- Financial Management;
- Project Management;
- Supply Chain Planning;
- Supply Chain Executions;
- Supply Management - Procurement;
- Tools and Technology.

New and ongoing trends that affect the ERP software:

- Mobile ERP solutions, in conjunction with the requirements of the managers and the employees, require real-time access to information no matter where you are;
- Cloud ERP;
- Social ERP solutions with social media;
- Two-tier and three-tier ERP.

Conclusions

- Resource planning systems are an integral part of modern manufacturing companies.
- Systems offer a vast array of tools to customize the software and meet the company's specific requirements.

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