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ENTERPRISE RESOURCE PLANNING SYSTEMS IN FUNCTION OF OPTIMAL SUPPLY CHAIN MANAGEMENT

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***Abstract*—**Increasingly sophisticated customer requirements have forced many companies to further explore opportunities to reduce cost, while preserving all the qualitative features that consumers expect from the particular product or service. Numerous companies find the solution for the realization of this goal through the application of modern management concepts. By applying the concept of "supply chain" many companies have managed to reduce their costs, establish long-term cooperative relations with its partners and achieve a remarkable level of competitiveness in the domestic and international markets. However, the application of numerous managerial solutions in the modern business environment is unimaginable without the support of adequate information, so that the possibilities of systems of enterprise resource planning in this paper will be indicated.

***Keywords*—**enterprise resource planning systems, supply chain, Internet.

I. INTRODUCTION

WE live in an "information age" where information technology is becoming a part of everyday life of contemporary organization. Information technology (hereafter IT) has a decisive impact on the quality of supply chain integration. Information is a key element of the supply chain because as the "glue" they join together separate links and provide integration and coordination of the flows of all organizations in the supply chain. Without IT support managers can not know what consumers want, what is the quality and quantity of supplies the vendors dispose of, and at what pace the production process has to take place. Without the information supply chain is "invisible" for managers. In order that all flows within the supply chain would be known to the manager and so as to improve its performance, it is necessary to use IT and build an information system that is able to register, process and transmit information at any moment necessary for the efficient and effective functioning of the supply chain. Information systems are the eyes and ears, and something that drives the brain of supply chain management (*Eng. Supply Chain Management)* in the field of data collection and information analysis, in order to make appropriate decisions.

The fact that IT is "daily" being perfected and is recording propulsive growth in all its segments has provided tremendous opportunities to companies' management to make their business operations more efficient and to achieve their goals more easily. It is on managers to assess what is the optimal combination of hardware and software solutions by which they will achieve high-quality integration and coordination of their activities and thereby improve the companies' performance.

II. SUPPLY CHAIN

A supply chain can be defined as a network of related and interdependent organizations, which are cooperatively engaged in controlling, managing and improvement of the flow of materials and information from suppliers to end users of the product [3].

The previous illustration shows a network of supply chain in central part of which there is a production company. The supply chain can be divided into three separate units that are connected through multiple interaction relationships in a whole thus making the circled supply chain.

The first part of the supply chain is the procurement chain through which the production company purchases all the inputs related to the production of the product or delivering the service. The company has to foster good relations with the input suppliers (raw materials, etc.) because "the initial costs" and the cost price of a certain product depends on the quality and prices of purchased inputs entering into the production process. Depending on the degree of association with the company, that is whether the suppliers are directly or indirectly through other suppliers associated with the company, we differ the suppliers of the first and second order.

The second part of the supply chain consists of the company, with its internal activities and processes, the character of which depends on the properties of the company and its interactive relations with the stakeholders. The third part of the supply chain consists of the network of buyers, that is the buyers who are also classified according to the association with the company, and we divide them on first, second and third order

customers and so on. In order to create high quality finished products that are valued by the end users, it is necessary that all participants in the supply chain network jointly participate in the creation of value, because by the joint efforts of all stakeholders the output of formed supply chain will meet customers' needs in the best possible way.

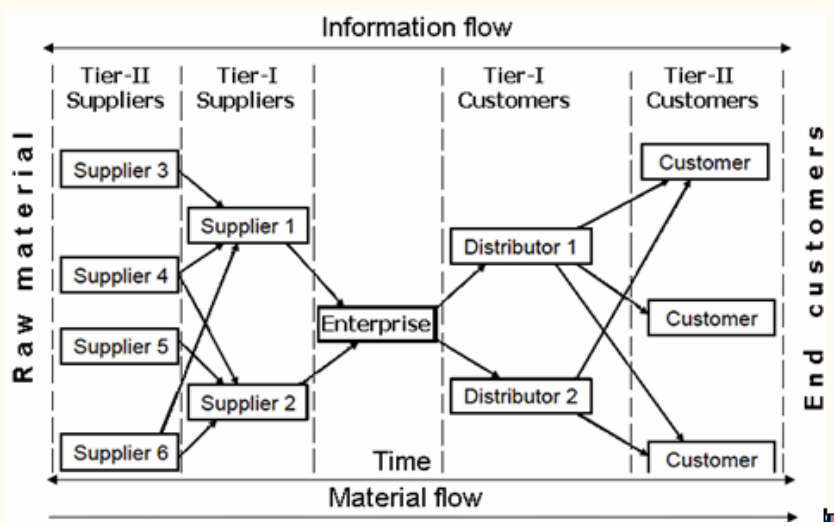

Fig. 1. Supply chain network

Within the supply chain information and material flows are performed. In modern well-designed and integrated supply chains, drivers of the material and information flows should be the final consumers of goods and services. It is believed that the conventional approach of "pushing" products towards market is too arbitrary and that in many cases it is not possible to predict demand for certain products. Predicting the demand is particularly difficult in a time of great market distortions so that the solution to the profitability of the company and the whole supply chain should be sought in meeting the demands of the current market demand. In order that companies in the supply chain respond in as much acceptable period of time to the requirements of the final consumers, it is necessary to apply modern IT solutions. Application of systems for enterprise resource planning has solved the problems of numerous companies so that the possibilities of the system will be pointed out further in this paper.

III. POSSIBILITIES OF THE ENTERPRISE RESOURCE PLANNING SYSTEM AND THE INTERNET IN THE FIELD OF INTEGRATION AND SUPPLY CHAIN MANAGEMENT

The Enterprise Resource Planning (ERP) systems, as the name suggests are used primarily for resource planning in the internal value chain of an enterprise and for integration of all functional units in the organization, in order to achieve the synergy in activities within the company. However, the company may establish through the Internet the connections to both the supply, and the distribution part of the supply chain, which ensures that all information entering into the ERP system are processed, the optimal steps taken and thus optimize the entire supply chain.

The importance of ERP systems is that it has managed to connect the unconnected functions into a broad business process and make the information "flow" through the organizational levels and functions of a company. The following figure reflects the information flow and the structure of the enterprise resource planning system as well.

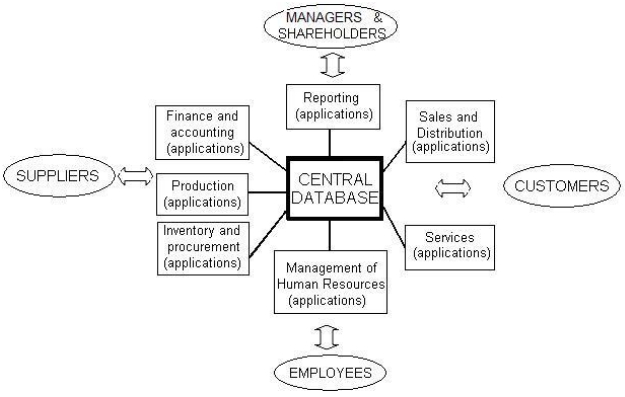

Fig. 2. The structure of enterprise resource planning system [2]

In Figure 2 it can be seen that the key part of the ERP system is the central database, which pulls data from other functional units, processes the transactions and sustains the series of applications of the entire enterprise. ERP is composed of a set of interdependent software modules that are connected to the central (shared) database. These modules provide support for internal business activities and are designed so that the users access them through a unique interface. It can be

said that the ERP allows information from the database to the other modules to flow as through "a circuit" and they always find their way to the user.

The possibilities of ERP system in the field of supply chain integration are best illustrated by the definition of ERP, given by Thomas Wallace and Michael Kremzar: ERP is: *"A set of management tools that balances demand and supply at the enterprise level, with the possibility of connecting the buyers and suppliers into a complete supply chain, using proven business processes for decision making. They provide a high degree of cross-functional integration between sales, marketing, manufacturing, operations, logistics, purchasing, finance, new product development and human resources. In this way managers are enabled to manage their business with a high level of productivity and customer service, simultaneously reducing costs and inventory levels."* [7]

Also, Customer Relationship Management (CRM) systems, i.e. systems for managing relationships with customer, enables synchronization of business processes of the internal value chain of an enterprise with business processes of the distribution part of the supply chain. The integration of these parts of the supply chain through the use of CRM software enables the rationalization of the supply chain processes, strengthening its competitive potential and meeting customer needs through delivering adequate value for money that they are willing to pay for the final outputs of the supply chain.

CRM software applications or tools can be independent, but can be incorporated into the ERP system, so it is up to their users to decide which combination of software solutions is to be applied for the integration of certain "links" in the supply chain.

Therefore, the companies making the supply chain can apply different software solutions to establish integration and coordination of the processes with its neighboring links. The integrative capacity of the mentioned IT solutions in combination with other supporting systems and supported by Internet technology enables the processes within the supply chain to be integrated and coordinated towards a common goal of all participants in the supply chain.

Figure 3 shows that ERP and CRM software solutions in combination with the Internet technology can be extremely effective in the integration of the supply chain. Organizations improve internal processes using ERP systems, while the Internet enables the integration of the processes between the organizations that make the supply chain [5]. Exchange of information via the Internet with many companies enables great savings. According to the results of the consulting firm Kilen & Associates, the companies using the Internet for the resource management can save about 5% of the cost of supply in that way, which causes the profit rise of up to 28% [1]. ERP applications enhance the synergy of all functions in the company, and represent a reasonable basis for the creation of product loaded by low costs and with higher value added, which certainly can not be achieved without the implementation of the mentioned solution.

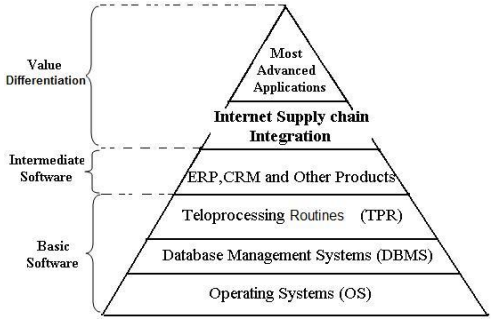

Fig. 3. Implementation of ERP, CRM, Internet and other IT solutions in the enterprise supply chain integration [4]

The development of IT, particularly the Internet, has enabled progress in the integration and supply chain management. The Internet enables the development of flexible supply chains where all members through it (from primary producers to end users) access the current information. In order to access the joint execution of activities in the supply chain it is essential that all members access to the common databases, and thus help with its coordination, optimization and overall profitability. The application of the Internet in combination with the system for enterprise resource planning (ERP), and APS system in the field of integration and exchange of information in the supply chain can be illustrated by the following example.

Figure 4 shows frequently applied model of supply chain management (SCM) that is being implemented in many companies in Europe and the U.S.A. In the central part of the model presented is Advanced Planning Scheduling (APS) system that is complementary and is used as a supplement to the ERP system because of its upgraded features especially in the area of procurement of materials and raw materials available. This is extremely important for generating future plans, so that on the basis of the set objectives the detailed optimal tasks schedules are formed. Therefore, in addition to APS systems representing the link between the ERP system and a supplier, they process information in a lot more efficient way related to the purchase of raw materials and components, allowing for the optimal functioning of the entire supply chain. APS software manufacturers' experience shows that 90% of customers who apply ERP and APS systems have positive perceptions of their joint application, as evidenced by the increase in the value delivered to the end users. Using ERP and APS systems as complementary has not yet fully come to life, precisely due to the impossibility of fitting software solutions from different producers of

these systems. However, to achieve as optimal integration as possible, and facilitate supply chain management, it is necessary to exhaust all the possibilities offered by modern IT solutions during selection of the "integration of elements" so that end users would get the expected value and the supply chain as a whole (with all its participants) achieve profitability [8].

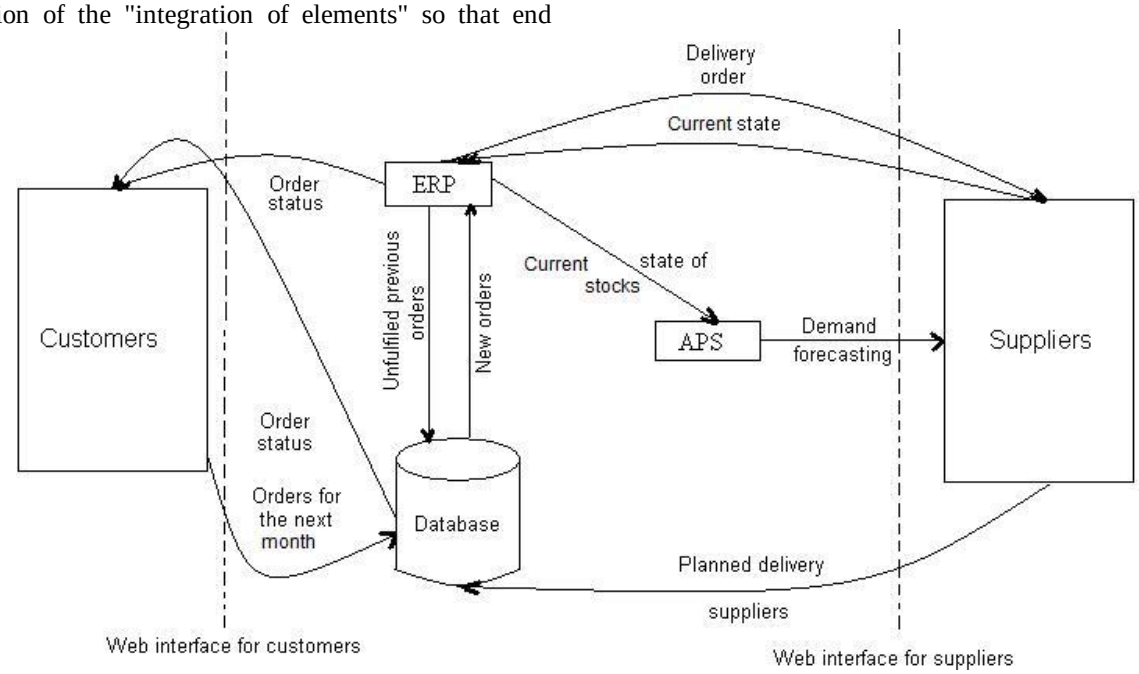

Fig. 4. An example of an advanced supply chain management system, which includes ERP, APS technology and Internet [6]

It is important to emphasize that the implementation of ERP systems can be very expensive, complex and time-consuming, and some data from practice say that the introduction of this system takes between three months and two years, depending on the organizational structure and wishes of the company. Therefore, the implementation of ERP systems should be viewed as a process of organizational change, and not as a replacement of the old for the new technology. This system influences on: strategy, structure, employees, culture, decision-making, and many other aspects of the company.

IV. Conclusion

By the implementation of ERP system the flows of activities in the supply chain are directed. In the conditions when the scarcity of all resources is evident, the information about the situation on the market, competitors, costs incurred in all parts of the supply chain, and other useful information provide crucial support for the selection of strategic directions of the company. The flow of information and materials in the supply chain has to be in the service of the consumers, because on their flow depends the speed at which the supply chain manages to respond to market demands. Thus, the "supply" the right information at the right time and the right place, is one of the key tasks of the ERP system, but also a prerequisite of good supply chain reagibility. If the foregoing conditions are not met it is possible to come to a standstill of material flows in the supply chain. In case of difficulties in movement of materials and information in the supply chain, it can come to a large number of unplanned costs and delays in the delivery of finished products, which leads to a reduction in the value of output of the supply chain. Consumers do not want to buy products that are burdened with high costs and that are not available in the required time, so that all efforts in managing the supply chain have to be directed towards the optimal functioning of the information and material flows in the supply chain.

It is important to emphasize that the use of IT should be an imperative for all companies doing business in today's turbulent environment, and should be compatible with the characteristics and actual needs of the companies. In many cases, even the use of some of the most effective IT solutions in the field of management of activities and processes in the company will not give absolutely any results if the company does not undertake to restructure its processes. Further, it is necessary that the company establishes long-term cooperative relations with its most important stakeholders, especially with customers and suppliers, so that the combination of hardware and software solutions would be meaningful.

It can be concluded that the benefits of introducing the system for enterprise resource planning are really tremendous and that these systems certainly have a positive effect on strengthening the performance of

companies. However, by the application resource planning system, all the problems related to the production and sales of goods and services will not be solved. The company has to simultaneously with the introduction of ERP invest in other important areas of operations such as: investing in improving the infrastructure of the enterprise, improving products and production processes, providing quality services so that all qualities of the ERP system could come to the fore.

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