

**ПРИМЕНЕНИЕ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ
В ТЕКСТИЛЬНОЙ ПРОМЫШЛЕННОСТИ
И ИХ ВЛИЯНИЕ НА ПРОИЗВОДИТЕЛЬНОСТЬ ТЕКСТИЛЬНЫХ ФАБРИК**

**THE APPLICATION OF INFORMATION TECHNOLOGY IN TEXTILE INDUSTRY
AND ITS EFFECTS ON PLANT PERFORMANCE**

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В статье анализируются возможности применения информационных технологий в текстильной промышленности, а также исследуется влияние информационных технологий на производительность текстильных фабрик. Информационные технологии рассматриваются как технологии для цепочки поставок и системы планирования ресурсов предприятия, которые дают возможность обеспечить ряд преимуществ в текстильной промышленности, таких как эффективные процессы, меньшие издержки производства, меньшее время производства и достижение стратегических и операционных целей.

This study aims to acknowledge and understand the application of information technology in manufacturing industry, particularly in textile industry, also the influences of the information technology on textile plant performance is discusses. The information technology presented in this study is technology for supply chain and enterprise resource planning system, which can provide several advantages in manufacturing industry such as effective and efficient processes, less production cost, less production time and other strategic and operational objectives. This study explains the significant role of the information technology in textile industry based on reviews on several information technology applications in the industry.

Ключевые слова: планирование ресурсов предприятия, информационные технологии, управление цепочками поставок, текстильная промышленность.

Keywords: enterprise resource planning, information technology, supply chain management, textile industry.

There are various technologies related to information technologies, which have been used in many industries. The technologies can be applied in several parts of the textile manufacturing or textile industry. The role of information technology in an industry can be seen in Fig. 1 (the application of information technology in manufacturing process [1]).

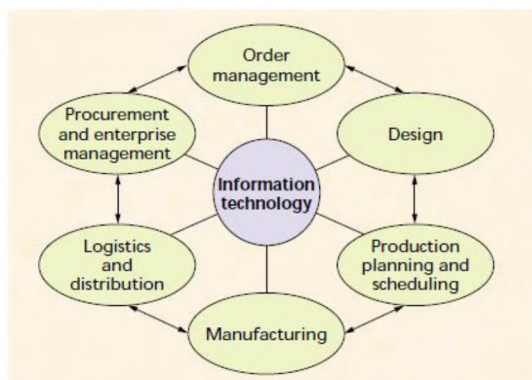


Fig. 1

The shared production model which is connected by information technology provides flexible manufacturing and management process. As can be seen in Figure 1, all the manufacturing process can be linked with the application of information technology. The flexibility of the manufacturing process which is provided by information technology can lead to high coordination and control of the processes. The flexibility of information technology uses can be noticed as the core of the industry competency [2].

The information technologies which are used in manufacturing industry particularly in textile factory are enterprise resource planning system and enterprise modeling framework. Both of these information technologies will be explained respectively in the next sections.

Enterprise resource planning system or abbreviated as ERP has become a significant factor for many firms and companies for increasing their effective competitiveness. However, the enterprise resource planning system can be very difficult to be implemented due to its adaption risk, high cost and the complexity of the system. The enterprise

resource planning system comprises several functions such as financial systems, human resources, material management, manufacturing process, fulfillment of customer orders and accounting. The system provides an imminent integration between the processes. Hence, the integration can occur due to the common database used by those processes. In addition, the integration takes place because the enterprise resource planning system removes the discrepancies between distinct software. The enterprise resource planning system has some advantages; one of which is that it is appealing to manufacturing industry since the manufacturing industry has many parts of work with incompatible purposes. SAP is the most dominant company in providing enterprise resource planning system software.

A cooperative vendor and proper selection of enterprise resource planning software system determine the successful enterprise resource planning project. The cooperative vendor plays an important role in examining the utility of the system, managing the alteration of business processes and implementing the system. Furthermore, there are several methods to decide the ERP software system. One of the methods is by applying zero-one goal programming, fuzzy linear regression and deployment of quality function. Another method to determine the proper ERP software system is by examining enterprise resource planning system based on nominal group technique. Besides those methods, ERP system can be evaluated by using analytic hierarchy process and neural network evaluation model for the enterprise resource planning system based on the perspective of supply chain management. The first step in the implementation process of enterprise resource planning system is establishing the best enterprise resource planning system software which is suitable for the criteria and necessity of the company. Therefore, the selection of proper enterprise resource planning system is an exceptionally crucial decision and hard task for company

managers. The successful implementation of the system can be affected by the selection of the enterprises resource planning system; also, the selection may affect the performance of the plant. Nevertheless, several companies apply the enterprise resource planning system without thoroughly comprehending the correlation between the companies' necessities and the system. This may lead to weak system and poor performance of the plant. The proper enterprise resource planning system offers numerous advantages for textile industry. Hence, this study provides a selection method of enterprise resource planning system for textile industry [3].

The analytical hierarchy process can be applied in several selection processes, for example car purchasing. Hence, the analytical hierarchy process can be used to determine proper enterprise resource planning system by using a comprehensive network of analysis process based on analytical hierarchy process. In addition, analytical hierarchy process is one of the greatly applied multi criteria decision making methods. One of the advantages offered by analytical hierarchy process is the simplicity for handling multiple criteria. Moreover, the analytical hierarchy process provides effective quantitative and qualitative data which are easy to understand. The balanced scorecard is one of the many methods to evaluate the contribution of enterprise resource planning system.

Balanced scorecard can be defined as tool or equipment which interprets the mission and vision of the company into integration of action and performance. The balanced scorecard assists the company in defining the major objectives of the company, the expectation and the benefits of the enterprise resource planning system. The balanced scorecard can help to match the business objectives of the company with enterprise resource planning system package objectives. In Figure 3, the balanced scorecard method is shown as a management factor determining the proper enterprise resource planning system.

The decision phase of the ERP system consists of the selection process regarding the packages of the ERP system. The system must provide all the objectives of the company as

depicted by the balanced scorecard. The selection process includes the analytical hierarchy process defined as an important necessity of the company objectives.

After the selection of the suitable ERP system for the textile industry, we can examine the work process and advantages of the system in the industry. The work process of the enterprise resource planning system is all about transferring up to date information in all connected sectors of the industry. This process can be seen in Fig. 2 (ERP system in textile industry) [4].

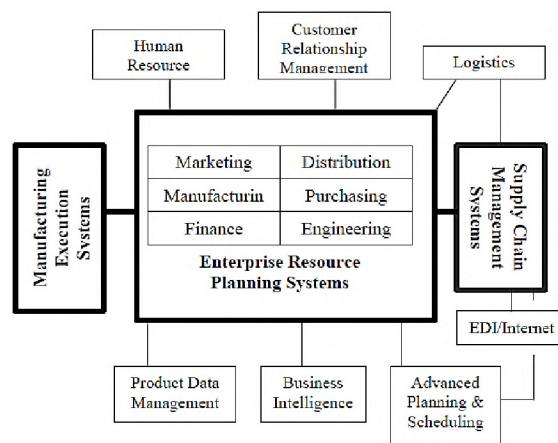


Fig. 2

The application of ERP in textile industry is presented in Fig. 3. As can be seen in Fig. 3, ERP system supports most crucial aspects of manufacturing process such as materials management, production control and others. The support of ERP system in textile manufacturing process can lead to improvement of productivity and quality of products [5]. Besides that, the ERP system supports the managerial processes, resulting in effective and efficient manufacturing and organizational purposes.

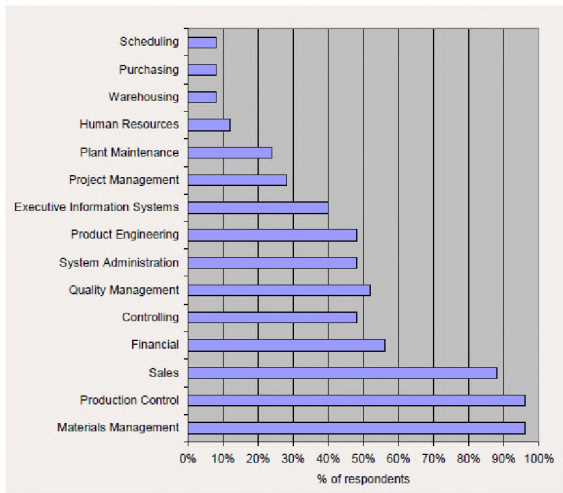


Fig. 3

Enterprise modeling framework (EMF) is the methodology for company or manufacturing sectors integration. This framework is applied to model three primary parts of a company, which are dynamics, information and function. In addition, the modeling framework requires the software tools to perform the methodology. Enterprise modeling framework has recently been applied in various industries, particularly textile industry. The enterprise modeling framework has major advantages compared to the enterprise resource planning. The main advantage of the enterprise modeling framework is the integration among tools and equipments, not only between the functional sectors such as one of the enterprise resource planning sample R/3 by SAP [1].

The three major models of the enterprise modeling framework are:

Dynamics. The enterprise modeling framework has a dynamics model, which is intended to record the behavior of the company functions which are time-varying. The dynamics model serves as a method to examine the operations of the company by applying simulations. When using the dynamics model, the users can prepare the resources with ease.

Information. The information model of enterprise modeling framework consists of such units as design, orders, equipment and operators. This model records the information needed to perform the company works; the information is presented in an arranged format. The model helps the company materialize the

vision. Hence, this model is fundamentally part of the information system which is addressed to assist the vision.

Function. The function model apprehends the desired scenarios and existing activities. The model helps the company represent the wanted state, which is in particular an evaluation of alternative strategies related to the business throughout the reengineering process of the business. In addition, the model also provides the understanding of current activities of the company. This can be done by monitoring the materials and data flow as well as noticing the required resources to execute the current activities of the company.

The main objectives of the enterprise modeling framework is to provide the users with the ability to incorporate the company activities with the three major models of enterprise modeling framework [1].

Supply chain management can be defined as the incorporation of major business processes from initial suppliers to the end users. The supply chain management includes information, services and products of the business. The supply chain management is currently improved by the information and the development of communication technologies. The technologies which improve the supply chain management are the World Wide Web, internet and electronic data interchange. These information technologies can control the escalating intricacy of the system. The information technologies play a vital role in the supply chain management since the supply chain management is relying on the performance of information sharing.

The application of information technologies can result in a smart textile factory with high quality products and less production costs [6]. Therefore, the role of information technologies may improve the plant performance if the proper system is selected precisely in accordance with the necessity of the business [7].

The enterprise resource planning system must be selected thoroughly in order to obtain best results from its application in textile industry. The results of the enterprise resource planning system selection depend on the analytical hierarchy process, as shown in Fig.

4 (the selected ERP system based on analytical hierarchy process [3]).

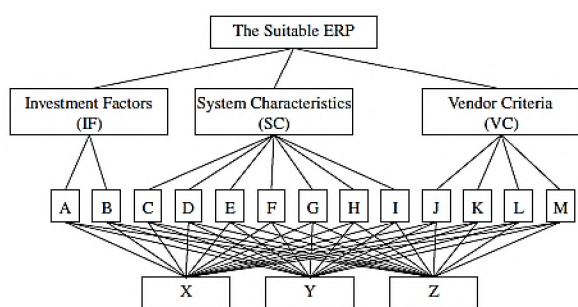


Fig. 4

The modeling process starts with “as is” function followed by “to be” function model. The modeling structure is very wide. This is related to the objectives of the model. The simulation and RBDMS (rational database management system) code produced from the modeling can be used to design and implement information system, alternative methods for manufacturing process, and reconstruct the manufacturing operation and process.

The implementation of information technologies in textile industry has several advantages that can lead to the improvement of plant performance and productivity [8]. However, the application of information technologies in the textile industry, such as enterprise resource planning and enterprise modeling framework, must meet the criteria and the necessity of the textile industry, both in operational and management fields.

The enterprise modeling framework provides decision support for manufacturing

operation and process, as well as the alternative methods of the manufacturing activities and the implementation of information system.

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