THE BENEFITS OF INFORMATION SYSTEMS IN THE MANAGEMENT OF INDUSTRIAL ENTERPRISES

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The ability to make good decisions on the deployment and use of information and communication technologies has become part of successful governance. The convergence of information, communication and multimedia technologies has created new business opportunities that will play a vital role in the economy and public life over the coming decades. On enterprises development in recent years has been dramatically influenced by the rapid development of technologies for processing and organizing them. These technologies share the role of an information integrator to support decision-making at all levels of the manufacturing enterprise. Enterprise resource planning is a key transactional application of enterprise information systems. Its main features include the ability to automate and integrate key business processes, functions and data across the enterprise.

KEYWORDS

Enterprise Architecture, business processes, information technology, identification

1 INTRODUCTION

The foundation of today's society should therefore be the ability to work with large volumes of data, to be familiar with them, to be able to draw relevant conclusions with them and to make decisions based on them. These are the prerequisites for the successful work of managers today. They are assisted in this by information systems supported by other information and communication technologies that fundamentally influence both the way they work with data and information and methods of decision-making and communication [Gala, et al., 2006].

Nowadays, information has become a source of production and labour, raw materials, production facilities or money. It is, therefore, necessary to obtain information effectively and, above all, to use it as a supporting tool for business management.

The word system is used in various contexts, and its meaning depends on the historical development of knowledge. Today, a system is understood as a purpose-defined set of elements and relationships between them, and the term system is used to denote a particular part of the natural world with characteristic properties. Nowadays, this concept gets a new dimension - information system [Sheer, et al., 2015].

The system is a purposefully defined non-empty set of elements and a set of links between them, while the properties of details and links betwen them determine the properties (behaviour) of the whole [Gala, et al., 2009].

Enterprise Architect (EA) software helps individuals, groups, and large companies design and manage complex information. This is often related to software development and design of IT systems and their deployment but may also be related to business analysis and business process modelling. Enterprise Architect integrates and integrates a broad range of structural and behavioural information, helping to build a coherent and trusted architectural model that is or will be. It also offers tools to manage versions, find differences, revise changes, and execute project development with security control and enforcement.

2 STRUCTURE OF INFORMATION SYSTEMS

An information system can be defined as a set of people, methods and technical means ensuring the collection, transmission and storage, processing and presentation of data in order to create and provide information according to the needs of information recipients active in management systems [Tvrdikova, 2008].

The information system is an artificial system, and one can significantly influence its quality and internal structure. The information system consists of the following components [Tvrdikova, 2008]:

Hardware (hardware) - computer systems of various types and sizes, supplemented with necessary peripheral units, which are interconnected via a computer network and connected to a memory subsystem for work with large volumes of data.

Software - consisting of basic software that manages computer activity, efficient data handling and communication of the computer system with the real world (e.g. operating systems) and application software that solves specific task classes of specific user classes (e.g. office) software, audio and video processing applications, etc.).

Organizational resources (orgware) - made up of a set of regulations and rules defining the use and use of the information system and information technology [Prajova, et al., 2019].

Human Factor (peopleware) - solving questions, adaptation and effective functioning of a person in a computer environment into which he / she is inserted.

Real world (information sources, legislation, standards) - context of information system, its external environment.

If the information system of an enterprise or institution is to be effective, none of its components must be neglected in its development.

3 BUSINESS INFORMATICS

Business informatics is one of the categories of applied informatics. Applied informatics means principles, rules of work with information and characteristics of related systems and their elements, which are essential for their use in the defined area of human activity. Applied informatics in informatics is obviously applied in various types of economic subjects, their connections etc. The level, character and combination of these subjects are very diverse and often very complicated from the point of view of the application of informatics [Gala, et al., 2006].

From the perspective of applications, respectively. Application in practice, we see informatics in the following possible dimensions, both [Gala, et al., 2009]:

Personal informatics - including data and resources at the individual level, such as your own personal computer, standalone reports of channels, expenses, tasks, software at the level of text editors, calculators, individual accounting programs, and so on.

Business informatics - as internal, representing information provision of complex business management - from finance, through production, personnel resources management, etc. and external, is informatics in business relations - which presents specific business applications and means for direct electronic communication and cooperation between business partners, sharing and selling a necessary business, technical and other information, continuous evaluation of the market situation, etc. [Obitz, et al., 2009].

Informatics and the state - we can also refer to state informatics. These are government-level systems (e.g. ministries), tax systems, welfare systems, police systems, etc. This group also includes systems working at the international level, such as. systems for UN, EU, Interpol and others.

Business informatics studies the expression and form of information, its processing and transmission in the company. Business informatics is a complex process of providing information needs associated with the implementation and management of business activities (processes) [Gála, et al., 2009]. This definition accepts a process approach in which information needs are met, while a complex process also addresses situations where appropriate transformation mechanisms do not exist, they must be new, not yet used. The enterprise information system is then the means used in the process [Sheer, et al., 2015].

4 ENTERPRISE INFORMATION SYSTEMS

Enterprise Resource Planning (ERP) is a tool that is able to cover the planning and management of major internal business processes, i. resources and their transformation into outputs at all levels of management, from operational to strategic. In most cases, ERP is the core of the application part of information systems and covers many of their functions and critical processes. The necessary internal processes are thought production, logistics, human resources and economics [Tvrdikova, 2008].

ERP is the type of application, respectively. Application software that enables the management and coordination of all available business resources and activities. The key features of ERP include automating and integrating key business processes, functions, and data across the enterprise [Gála, et al., 2009].

The primary purpose of these systems is to integrate enterprise-wide sub-business functions, integrating different business applications that cover departmental and union information needs into a single application working on a common database, reducing the risk of inconsistency, processing inefficiencies, and possible errors in company data [Morris, 2011]. Data is entered only once into the ERP system, and each user has access only to the data that he needs and is allowed to work with the most essential features of the ERP system are [Lankhorst, et al., 2006]:

- automation and integration of business processes;
- data sharing, procedures and standardization across the enterprise;
- creation and disclosure of information throughout the enterprise;
- ability to process historical data;
- a comprehensive approach to ERP solutions

Business practice requires the better interconnection of internal processes with external processes. For this reason, ERP systems have evolved to ERPs in terms of the need to integrate other business processes, with CRM (Customer Relationship Management) as a customer relationship management system, SCM (Supply Chain Management) as a supply chain management and BI (Business Intelligence) [www.sparxsystems.com].

5 ERP APPLICATION FEATURES

The functions of ERP applications can be divided into the essential tasks that are associated with the three basic circuits of transactions (economy, logistics and human resources) and the extensions. The individual functions are grouped into application modules. The range of functions and scope of application modules can vary widely across different ERP applications.

ERP applications provide a wide range of features and are most comprehensive in relation to other types of applications. If we want to compare the functionality of ERP applications of different suppliers, then it is good to draw attention to these pitfalls [Gala, et al., 2015]:

- ERP functionality is pervasive and therefore, more detailed comparative analysis is quite complicated and time-consuming;
- the structure of the functions, and thus the menu structure, is very different between different ERP applications;
- various ERP application vendors use partially different terminology, different names for similar functions.

The basic ERP modules or feature groups include [Gala, et al., 2015]:

Economic governance - must provide a comprehensive view of the economy of the entire organization and the effective implementation of financial operations. It usually includes general ledger and individual journals, bank relationship management functions, asset management, cost accounting. The module provides a comprehensive overview of financial operations in the company, evaluating the company's economic performance and its business units and continuous provision of compliance of the information system with legislation.

Sales and marketing - includes, in particular, integrated support for customer management, sales activity management and marketing, displaying relationships between customers, buyers, suppliers, employees and competitors, managing business opportunities, sales management, support for creating and executing marketing campaigns, and evaluating their results.

Purchasing and warehouse management - Provides support for processing purchase requirements, stock assessment and own supply operations, supply price analysis, material requirements record of individual manufacturing and other centers, and communication of purchase and inventory management requirements [Basl, J. 2011].

Human resources management - Ensures personal records and, in particular, supports the direction of the company's staff development, its efficient use and recruitment.

The production module is focused mainly on production planning or production orders, monitoring their status and performance concerning deadlines, monitoring and evaluating a stock, and production management at the operative and workshop management level.

Most manufacturers supply specialized vertical solutions for particular areas, which differ by the composition of modules, functionality and support for individual processes. The overall degree of process automation by implementing an ERP system is different in every industry. The common area occurring in all verticals is support for purchasing and accounting processes.

6 BASIC ERP COMPONENTS

ERP systems work predominantly on a transactional principle and share data in common databases or use data interconnection between modules for sharing. Thus, ERP systems enable data and process sharing and standardization across the enterprise, real-time data creation and access, and historical data processing. A characteristic feature of ERPs is their modularity, which is essential for the selection of application modules. The basic components of ERP are [Obitz, et al., 2009]:

- application modules,
- whole application management modules
- system modules (operating schemes, modules dealing with the interface of database systems).

However, ERPs include other modules that are operational or supportive in nature [Tvrdikova, 2008]:

- software customization modules - for customization to your business needs,
- custom development environment modules,
- integration modules - facilitating the creation of interfaces with other types of applications and technologies,
- implementation modules - supporting the deployment of ERP in the given corporate environment,
- technological and administrative modules - modules for setting operating rules, for setting the communication structure, for setting user access rights to both data and functions, ERP modules for recording and analysis of operations transferred in the system,
- documentation modules - online documentation of application modules and functions.

7 ERP TECHNOLOGICAL AND OPERATIONAL PRINCIPLES

ERP modules share common data, either on the basis of shared databases or based on mutually shared data inputs and outputs. The result of this approach is that [Junkers, et al., 2006]:

- transaction in one module can automatically generate the desired action in another module,
- transactions are consistent and mutually controllable;
- it is possible to verify individual modules' functions and find out the consequences and principles of individual transactions.

From the database point of view, ERP systems are solved and operated chiefly on relational database systems. The most common are systems from companies Oracle, Microsoft, IBM and others [www.oracle.com].

ERP systems can be considered the basis of the whole information system. This implies that the basis of ERP is application software capable of realizing bindings respectively. Interfaces to most applications and technologies, as long as they are no longer integrated within ERP II, distribute peer-to-peer data between applications and modules. Examples of links are [Ross, et al., 2010]:

- Computer Aided Design (CAD) design graphics,
- warehouse management applications and technologies,
- links to geographic information systems GIS.

8 BUSINESS INFORMATION SYSTEMS IN INDUSTRIAL PRACTICE

To illustrate business information systems in practice, we chose one of the ERP modules, specifically the Production module, which is focused mainly on production planning, or production orders, monitoring their status and performance concerning deadlines, monitoring and evaluation of stock, production management at the level of operative and workshop management.

The analysis of the industrial enterprise XY revealed that the enterprise uses SAP as an enterprise information system. It has implemented a number of different modules that support all significant activities in the company. These are, for example, modules that support logistics, warehousing, purchasing, production, quality, finance and controlling [www.sap.com]. All data is stored in the SAP system, but the industry uses MS Excel for reporting. The data in the SAP system is exported to MS Excel, where the output is then various tables and graphs.

SAP is considered to be the leading software that the company uses in production. Another software it operates in the manufacturing process is software that serves as a computer-aided manufacturing system. It is an application aimed at monitoring the progress of the production process.

The company's central information systems can be divided into SAP system modules and a software application to support production systems [Patel, 2010].

Table nr.1 compares the functions of both software and lists the functions that only SAP PP software has.

Functionality	Software application to support production systems	SAP PP
Management tools for evaluating production data		X
Easy connection to an external application that allows automatic configuration of products, as well as connection of optimization and design software		X
Visualization of technological procedures and BOMs		X
Automated input of work performance using chips, readers or terminals linked to the attendance system		X
Own integrated development environment		X
Support of specialized production systems (AutoCAD, ..)		X

Table 1 Functionality of systems - lists functionalities that only SAP PP software has

Information technologies in the company are widely used. The analysis of the given industrial enterprise pointed out the following strengths and weaknesses of the used solutions [Obitz, et al., 2009]:

Strengths:

- good IT support solution in critical situations,
- good information of employees working with IS,
- access to the intranet and some local applications not only via PC but also through terminals located around the workplace,

- good security of sensitive data - display and modification - based on various access rights,
- central data database,
- clear intranet page,
- use of IS in all sections of the company.

Weaknesses

- insufficient information on the company's website, poor content,
- unified access, the need to use support applications for data entry,
- low number of terminals at the workplace,
- minor communication problems between individual workplaces,
- more significant financial burden of developing own products,
- the use of two databases (DB2 and Oracle) and the resulting higher financial burden, to obtain two licenses.

9 RESULTS

The analysis showed that it would be more advantageous for the company to choose a unified approach and replace the software serving as a computer-aided production system with a module from SAP, a Production Planning Module (SAP PP). Implementing the SAP PP module would shorten the data flow and optimize the overall environment. Because the SAP PP module is used in many companies and many analysts, designers, and programmers are involved in the development, a range of possible variants for production management are much more comprehensive. The SAP PP module contains all master data, system settings, and specified actions for creating the Plan to Produce process. It has all the essential information for the implementation of the production process plan. It includes data and procedures related to inventory, a list of input materials, logistics and data on work centers, sales and production plans, long-term planning, demand management, material requirements planning, production capacity planning, production orders, etc.

Figure 1 shows a flowchart containing master data and processes.

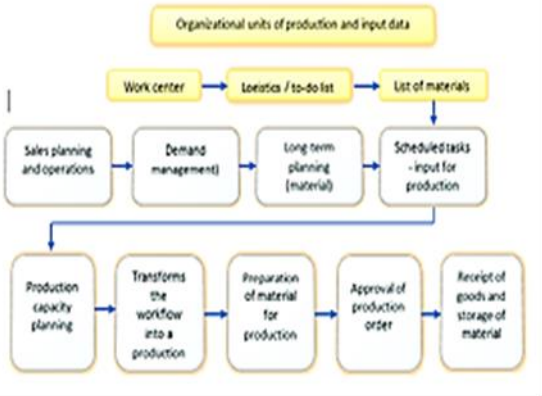

Figure 1. Production process plan diagram using SAP PP

SAP PP consists of the following modules:

- Master data - contains material management, workstations, logistics and material list.
- Sales and Operations Planning - This allows you to predict sales and production plans based on historical, current, and future data.
- Distribution planning - allows you to plan the need for distribution centers.
- Production planning - includes material consumption planning, demand management, long-term planning and production management.
- Material consumption planning - depends on the data obtained from the analysis of demand and supply, calculating the net material consumption in individual production operations.
- Work center control - includes processing of production orders, movement of goods and materials, confirmations and reporting tools for production.
- Capacity planning - capacity utilization based on data and capacity of individual production centers.
- Repeated production - the production process is simple; one product is produced for a long time. This module manages operations for companies with repetitive production in SAP.
- Production cost planning - evaluates the values of time and input components to determine the cost of production.

In a given industrial enterprise, we decided on the SAP PP module due to the large number of benefits that result from this for a given industrial enterprise. These advantages include, in the first place, fast adaptation to changes, fast adaptation while increasing productivity, improved overview, up-to-date data at any time, the possibility of tracing individual data and data flows, cooperation with other applications, e.g. MS Excel, the possibility of using abbreviations for working with transactions, facilitating communication within the company, exchange and integration of data with other systems, monitoring of material flows, centralization of data through a central database, acceleration and streamlining of economic processes.

To illustrate the SAP PP environment, Figure 2 shows an example of selection criteria for controlling the stock of raw materials.

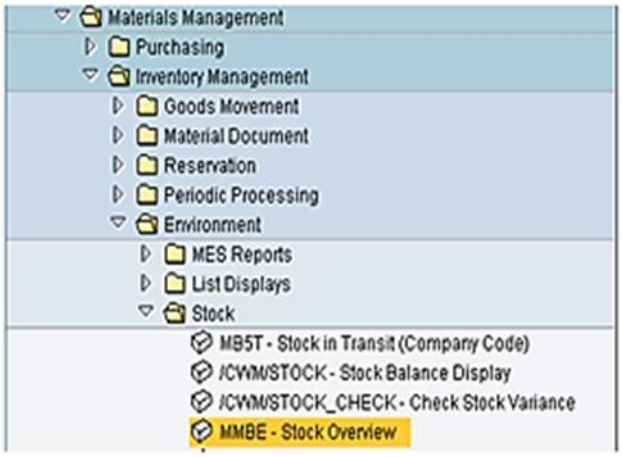

Figure 2. Example of selection criteria for controlling the stock of raw materials

Double-click on the transaction code to specify the selection condition according to the entered requirements.

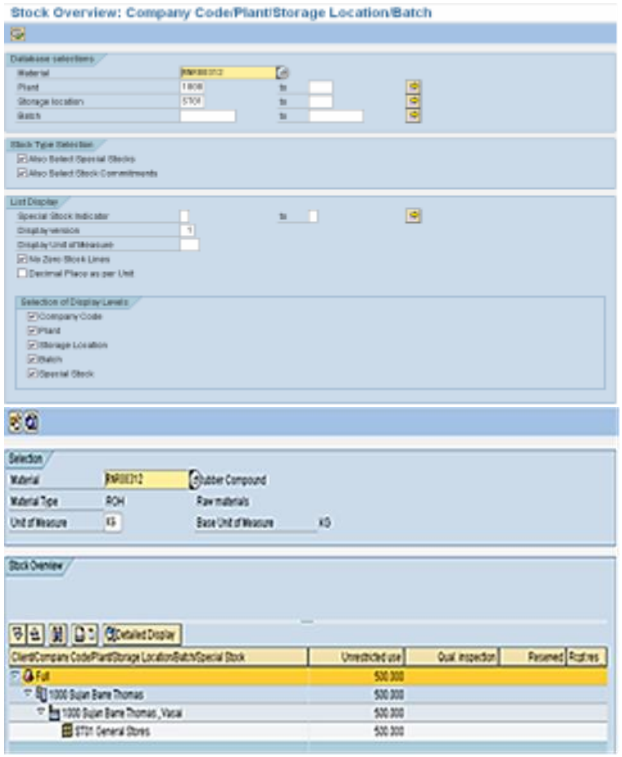

Figure 3. Stock Overview: Company Code

The system will show the stock as of that particular Item. The design offers you the actual store lying at different areas such as unrestricted, quality inspection, reserved and blocked supply etc.

Figure 4 shows the check bill of the material process. In this case, you must enter the material number whose BOM is to be displayed and executed.

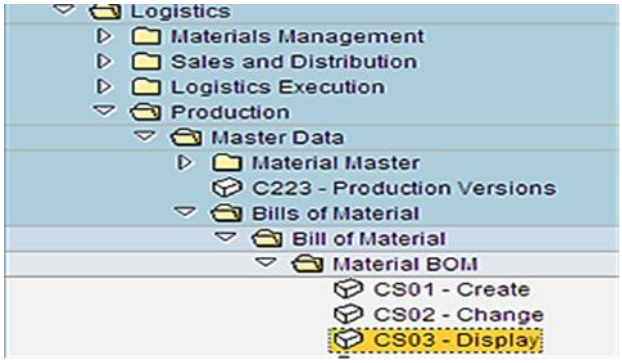

Figure 4. Checking standard BOM

The system displays the BOM with details such as the material contained in the BOM, the component description, the required quantity with a unit of measure, as shown in Figure 5.

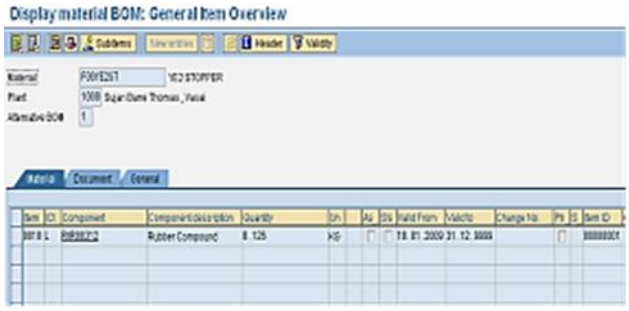

Figure 5. Display material BOM

The original software used in the company is not advantageous for it; it should be replaced by the SAP PP module, as shown by the analysis, to manage production more efficiently.

For the following reasons:

- use of one database,
- if all the data were put into a single database, one backup server would be needed, and the other could be used as a separate server,
- one license is enough,
- one support is enough,
- shorter time for database maintenance, installation of new versions and add-ons, analysis and removal of errors that occurred during operation,
- faster data processing.

From a financial point of view:

- reduction of own product development costs,
- reduction of support costs,
- reduction of costs necessary for licensing rights,
- reduction of loss when suspending the production line.

On the other hand, for a given industrial enterprise, a given module also has certain disadvantages. This included unification (standardization), which can, to a lesser extent, a loss of "tailor-made" functionality of the current solution, initial ignorance of the SAP environment, more extensive implementation - which is time-consuming, higher maintenance costs of implementation user units, need to have correct and constantly updated data in the system - otherwise, there may be an error, the need for constant control and, last but not least, there may be problems with external consultants.

10 CONCLUSION

Enterprise Resource Planning is a new concept that extends the strategic management practices of the company. The idea introduces a complex and holistic view of the business in a challenging economic environment, allowing management to make informed decisions about the business's direction, recognizing all the consequences of such decisions.

Since the enterprise resource planning model reflects the state of the system, which is constantly evolving, changing and improving, it is essential to realize that Enterprise Resource Planning will never be completed, and its model should be continuously updated in a controlled manner.

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