Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 99 (2013) 1035 – 1043

Procedia
Social and Behavioral Sciences

9th International Strategic Management Conference

The Effects of Management Information and ERP Systems on Strategic Knowledge Management and Decision-Making

Ahmet Uçaktürk[a], Michel Villard[b], a*

[a] Kocaeli University, Civil Aviation Academy, 41285, Turkey
[b]Swiss Association for Quality and Management Systems (SQS), Rainstr. 42, 2503, Biel/Bienne, Switzerland

Abstract

Today's enterprices require more information and communication in order to reduce costs under the current scarce resources, to shorten delivery time, to increase quality and product variety, in other words, are obligated to develop "an integrated information system". Enterprise Resource Planning (ERP) systems help unleash the true potential of companies by integrating business and management processes. In this study, how and in what direction Enterprise Resource Planning Systems affect the decision of the upper and middle level managers of businesses together with the effects of ERP systems on strategic knowledge management to make enterprises more innovative and competitively advantaged, transformable, and decisions based on ERP systems will be investigated. As a result of literature review study, the role and the impacts of these systems on strategic information management and decision-making will be investigated with both global and local business application examples.

Selection and peer-review under responsibility of the International Strategic Management Conference.

Keywords: Enterprise resource planning; strategic decision-making; information management; strategic information management

1. Introduction

A good management is possible with good information being provided. Information technology, aimed to increase the performance of businesses in this context, is an important area of their substantial investment. ERP (Enterprise Resource Planning) systems, by integrating basic functions such as

* Corresponding author. Tel. + 90-532-388 0641 - +90-262-351 3310
Email address: aucakturk63@gmail.com

1877-0428
Selection and peer-review under responsibility of the International Strategic Management Conference.
doi:10.1016/j.sbspro.2013.10.577

production, finance, marketing, human resources management, is a computer-assisted business management covering all business in a common information system platform. These systems, first of all, provide compatibility in the making collection of data and information in the organization, processing, analyzing and integration and compliance in decision making and provide planning and control functions in compliance. On the other hand, these systems play a role in increasing the effectiveness of management functions by providing the information needed for planning and monitoring process (Bensghir, 1996).

The strategic role of information systems consists of use information systems and technology to develop products, services and competencies providing businesses to gain advantage over competitors. This creates the concept of "strategic information systems" supporting the business strategies, and the position among the competitors (O'Brein, 1997). Strategic information systems is defined as the tools using knowledge, knowledge transformation and / or information communication when developing and implementing business strategies (Earl, 1993).

ERP systems are the most preferable in decision-making process in management. This is because the ERP is responsible for forwarding information gathered to necessary management levels as soon as possible when encountered a situation or problem. Therefore, ERP, is now an important assistant position for managers (Anameriç, 2003).

Although it is performed through MIS the decision-making process is also done according to a plan. In "Simon Decision Model", developed by Herbert Alexander in relation to the decision making process in MIS and widely used, Decision-making process is discussed in three stages. These stages are research, review and select (Simon, 1960). Some sources address the decision-making process in five stages. The first three stages developed Simon consist of research, investigation and choosing. The other two are the implementation and monitoring stages (Martin and Powell, 1992).

This study begins with definition section of "Management Information Systems", "ERP Systems" and continues with concepts of " Creation of Strategic Information " and "its management" and examples of companies and firms. After the explanation of how prosperous companies and firms caught the success it will be finalized with a conclusion.

2. Literature Review

2. 1. *Management Information Systems*

When the civilization history accruing with the development process of mankind is examined it will be noticed that each period was shaped by a number of characteristics emerged from the circumstances. In an agricultural society, the importance gained by land and agricultural tools, discovery of steam during the transition period from agricultural society to industrial society, and achievement of mass production by the effect of steam use in transport technologies and capital as the main source of business purposes during this period there have been prominent. Post-industrial society have become information society or knowledge society and knowledge is described as a strategic factor (Ince, 2006). Role of information system has been increasing in the creating competitiveness of enterprises and plans for the future. Administrations in enterprises need accurate, complete, timely information in decision-making whenever

they want. It is necessary to establish an management information system receving support from electronic communication technologies that will help provide this information. It is of utmost importance to ensure effective use, by the administrator, of Management information system established. (Demirhan, 2002)

Information in management is the collection of data used for decision-making. Management information desired for an organization is all of meaningful data which show the activities and are stored, processed, amended and most importantly, are submitted to the units and managers as report. Today, information has become a strategic resource. In this respect, it is necessary that the knowledge should be managed. Enterprise Resource Planning Systems processes this information to use in decision-making and makes it meaningful for the decision maker / practitioner. At the end of this process which information is the input, the output is also information.

2.2 ERP Systems

Advanced information technologies have become an indispensable part of today's business in competitive environment and speed. The emergence of new information technologies takes place promptly. Rapid changes in information technology enabled enterprises focused on to use more complex and information technology-based systems, which institutional resource planning systems is one of them. The development process of ERP until today is presented below. (Postacı, Belgin, Erkan. 2012).

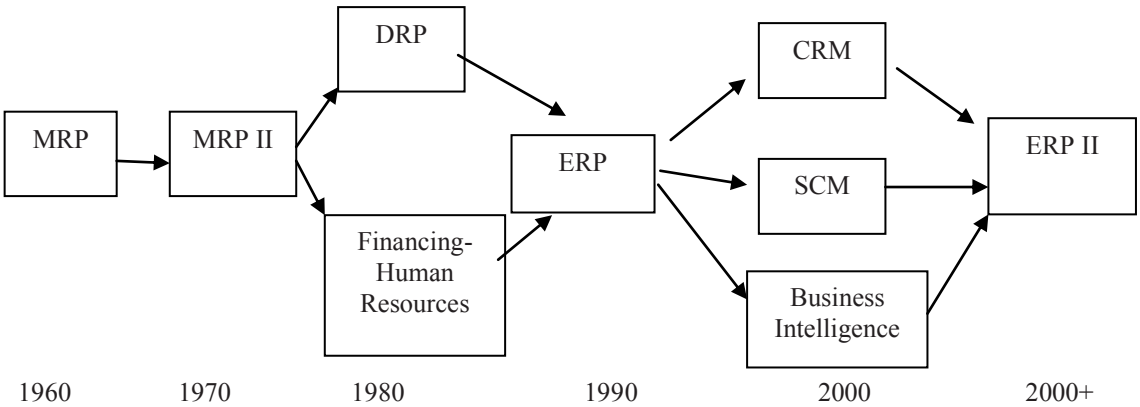

Figure 1. Development Process of ERP ***Source: Güleryüz (2007)***

Today, increase in global competitions necessitates efficiency and effectiveness of supply chain of companies and increase in their performance. The way to reach this goal is through the successful implementation of the ERP (Enterprise Resource Planning-Enterprise Resource Planning) software to the system. (Postman, Leader, Erman, 2012). ERP is a business management system that is fully integrated with computer-aided to enable an organization to have competitive advantages by covering every

functional area of that organization with the feature of wide scale integration capability over most of these areas (Gok, 2005). An ERP system is a software solution that contains many sub-systems approaching process-based by designating targets for the enterprise and serving responses for data and information needs by tightly integrating all functions. With this feature, it is a detailed information system for the enterprise. This system consists of package programs that connect the various functions of the enterprise. (Selimoğlu, 2006).

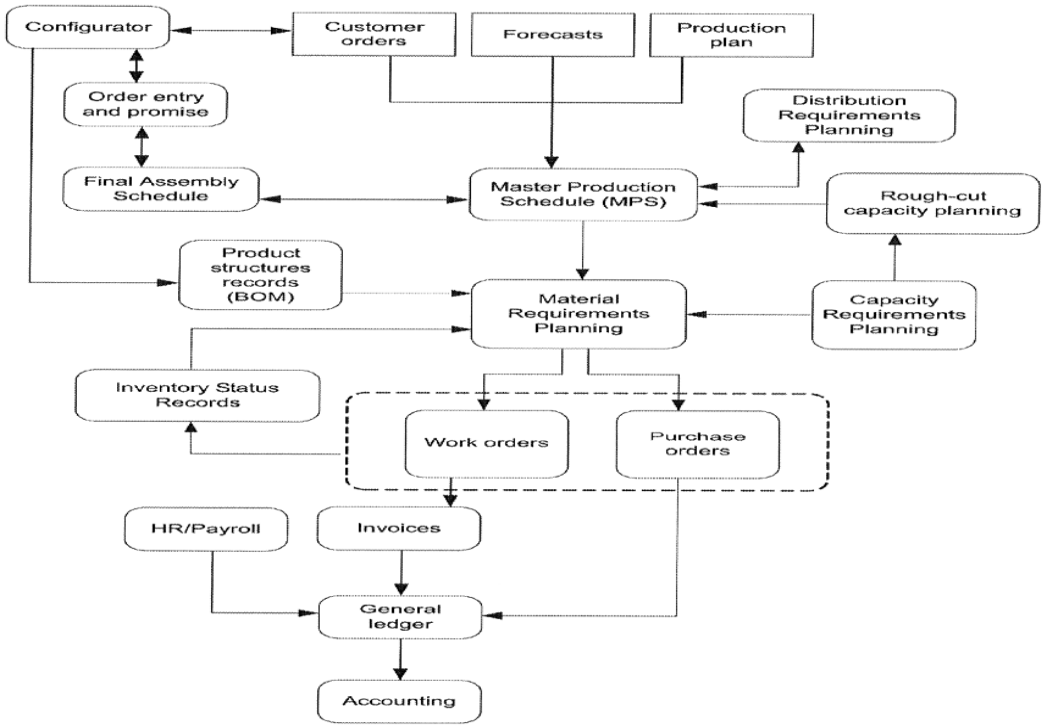

Figure 2. General Structure of ERP System **Source: Helo and Szekely, (2005)**

ERP systems gives dynamism to companies with tactical and strategic decision support based on current knowledge and provides managers in strategic and tactical management level immediate accurate and current access to information with Management Decision Support Systems. There are eight strategic advantages of ERP systems. These advantages are the followings:

1 - Increase in flexibility, 2 - Increase in productivity, 3-Healthy communication, 4-Low operating costs, 5 - Revenue growth, 6- Short cycle time, 7 - Effective co-operation 8-High profit margin. (Postacı, Belgin, Erkan. 2012).

Organizations are required to manage change in order to exist in products, services and capital markets just like living organisms, in order to change, compete and create value added. By accepting ERP systems a living organism, there are many modules help them make decisions consistent with speed and efficiency of market conditions and in line with requirements and expectations of enterprises. Management of change is used synonymously with information management. Due to the management of strategic,

operational and financial information and making the change in light of this information, it is predicted that strategies and practices is constantly compared with competitors and best practices, organizational structure and human resource management strategies are compatible with strategies of management, business processes is integrated into business strategies, infrastructures of management and information systems are integrated into business processes. Solution concepts of ERP systems are focused on ensuring the competitiveness and increase in value in each organization in all business cycle until figuring out competitors and best practices in market conditions. ERP offers users very wide reporting opportunities. In addition, it can provide user support to solve the problems due to high analysis capabilities that it has. Due to the flexibility of structures, It allows reporting and creating a report for a user on any particular problem. Thus, by processing data in information bank of enterprises, hit rates of decisions of managers are very easily increased. In addition to providing automation, ERP system feature of providing accurate and timely information enables to improve decision-making processes of the managers and employees (Hitt, Wu and Zhou, 2002)

The following table includes evaluation of the opinions on the strategic advantages obtained with the use of ERP systems. In this evaluation 5-point Likert scale was used. According to this, the strategic advantage with the largest average value is healthy communication. This is followed by strategic advantages like efficient collaboration, distribution, logistics, shorter cycle times, increase productivity, lower operating costs, supply logistics, increase in flexibility, customer satisfaction, human resources management and strategic advantages and income growth. The strategic advantage with the lowest average value is high profit margin. Overall average value was found to be 3.57. (Postacı, Belgin and Erkan, 2012)

Strategic Advantage	**Average**
Healthy communication	3.84
Effective collaboration	3.79
Distribution logistics	3.76
Short cycle times	3.73
Increase in Efficiency	3.72
Low operating costs	3.60
Supply logistics,	3.58
Increase in flexibility	3.53
Customer satisfaction	3.52
Human management resource	3.48
Revenue growth	3.39
High profit margin	2.94
The overall average	3.57

Table 1. Strategic advantages obtained by the use of ERP
Source: Postacı, Belgin and Erkan, (2012)

In a study using a sample of 50 enterprises establishing ERP systems between 1993 and 1997, the following variables are used as means of measuring financial performance:, "Sales Revenue Per Marketing, Sales and Distribution Expenses", "Sales Revenue Per General Administrative Expenses", "Sales Revenue per Sale Cost ", "Sales Revenue Per Employee". According to the results of the study, it is found out that "Sales Revenue Per Employee" and "Sales Revenue per Sale Cost " have decreased for three years for enterprise completed the installation of ERP systems. However, there has not been any improvement detection on "Sales Revenue Per Marketing, Sales and Distribution Expenses" and "Income Revenue Per General and Administrative Expenses. (Poston and Grabski, 2001).

It is obvious that Life of today's enterprises is likely to be persistent through the use of correct decisions taken by ensuring the right information and transforming information to the knowledge. Basic requirement for planning and decision-making is to coordinate among individuals and groups participating groups in decision making with different powers and responsibilities and to ensure to achieve common goals. Service provided by information systems, collecting and processing information via data processing systems and transforming it to knowledge, was emerged by processing this information through MIS in accordance with purpose of preparing reports. (Ülgen, 1980).

Looking at the literature on information systems, two types of strategic information system are generally mentioned (Kini, 1993). 1. In a certain job field, systems developed as a result of a creative idea created from a set of new information technologies, which are specific to this business only and not similar to other businesses. 2. Systems available in a wide range, but their strategic value depends on how they are used.

Information systems and technologies may be used in enterprises, as a strategy, to gain competitive advantage, increase productivity and performance, to develop new methods in management and organization, and to create new business areas (Peppard, 1993). As businesses grow and attain significant proportions at the country level, their activities will be affected by various internal and external conditions and, resolving, in a particular way, strategic and political management activities of such as a business will become difficult and thus the assessment of information related to all these will get hard to without using computer. (Yozgat, 1998)

Organizations implement ERP systems to integrate business processes in various functions. ERP system is capable of converting automation of all business processes as a whole, instead of only the functional units. From Workshop activities to performance monitoring activities of managers, integration for all activities is achieved through ERP applications integrating a variety of computer hardware and software platforms with another (Palaniswamy and Frank, 2000)

3. Strategic Knowledge Management and Decision-Making

In phase of achieving the goals planned, there can be a lot of situations that can occur in and organizations like changes and troubles both inside and outside the organization and so on. An organization in these conditions struggles to get out of this situations with the least lost or maximum earnings. In order to tackle with this struggle, it is necessary to make desicion in management level. To make a decision, it is necessary to have the information. A management information system (MIS) provides information to make decision. The decision types are basically divided into two sections. These

are "unprogrammable" and "programmable" decisions. Constant repetition of Programmable decisions let rules and the necessary arrangements to be made easily for these decisions. The advantages of programmable decisions is to be able to exploit from previous rules and decisions, that is, decisions already in execution, before making a decision. However, there is no such a regulation for unprogrammable decisions. These decisions are kind s of the desicions that requires complete exploration. The basis for information flow and transmission in organizations is formed from databases created, decision models, tables, reports and special information systems. Management information systems (MIS) provides a portion of external infromation of the organization by communicating with databases outside the organization. MIS helps managers to make a decision via internal and external information. For example, the planning process is collection of decisions. That is why planning will be so efficient, realistic and reliable as MIS is used in decision-making process. (Anameric, 2005). Programmable decisions in Management can be used mostly in routine control operations of the organization like purchase, storage, inventory and accounting. Nonprogrammable decisions are composed of the decisions on status of the organization to a large extent. MIS is mostly preferred in decision-making process by management. This is because the MIS is responsible to convey the information collected to the management level immediately as soon as problems and situations are encountered. Therefore, MIS is in a place for an important assistant to managers.

MIS can be defined as "the collection, storage, evaluation, and communication and use of human resources and computer-based collection to increase the effectiveness of business plans and management functions" (T. Lucey, 1991). MIS "is a management support system and provides preparation and submission of summary reports by routine tasks that predict the future performance of the business with planning and control of current activities of a company." (KC Laudon and JP Laudon, 1993). It, especially, realizes, as administrative, observation and control of functions and resources in organizations. As seen from this point, it can be also perceived as management monitoring and control system. One of the purposes of MIS is also to realize the observation and control of operations of organizations by the management. Tactical management or middle management composes a wider segment of organizational management. These tier managers usually confront with procedures that are more complex, unexpected and require reasoning, intuition, and personal communications. Middle level management is focused on monthly, quarterly or annual mid-term transactions. These procedures are allocation of resources and organization, structuring business and training and organization of personnel. the Typical mid-level management practices are budget reports, variable analysis and personnel planning. Tasks of middle level managers are planning of production/ service, creation of budget, short-term forecasts, the management of employees (Davis, 1997), (Öğüt, 2003), (Tiwana, 2003).

When processing data quickly and economically, MIS creates an additional step for manager to select and summarize the information used in decision-making. For example, in determining the total amount of overtime pay, while processing payrolls, an extra small computer operation is necessary to analyze the work days of each department. Decision-making becomes complicated with redundant information, and gradually develop into impossible. To avoid this, information flow and data must be well organized. An administrator, when making a decision, needs support information for the decision and at this stage, the system developed for this is referred to as Management Information System. With the help of this system, managers at all levels can only be equipped with the information as needed, and related. From the most general sense, MIS, as an interdisciplinary area of study, copes with providing information for the decision-making process and management of information technology (IT) in organizations and the

integration of organizational change efforts of IT strategy is. (Ateş, 2007) Today, MIS is becoming increasingly important concept since information technology, in conjunction with information system become an effective arbiter in decision of the management. (Sağsan, 2002)

There are several reasons for gaining importance of Management information systems that help the management, more and more. The reasons for gaining importance of management information system are possibly as follows. **a)** Reduction of capabilities of Managers, sufficiently, to deal with such issues as personnel, machinery, equipment, raw materials, money for various reasons every day and lacking of source of information, in this regard, to support the manager adequately. **b)** Getting faced, by managers, increasingly complex, decision-making situations and increase in the number of factors to be taken into account. **c)** Day by day increase in the rate of change factors. **d)** Being in large organizations, of enterprises, such as large markets, economic conditions, social responsibilities and so on, and their desire to maintain their sustainability under these conditions. **e)** Obligation to establish better communication channels in order to meet accurate and timely information needs of managers as organizations developed.

Although it is performed through MIS the decision-making process should be done according to a plan. The decision-making process in "Simon Decision Model" that was developed by Herbert Alexander Simon in decision-making process in MIS and widely used is discussed in three stages. These stages are research, review and selection. Some sources are addressed decision-making process as five stages in the. For these, the first three stages consist of three stages developed by Simon, research, study and selection. The other two stages are implementation and monitoring. The research is the phase of investigating the problems encountered or possible to be encountered in future and the collection of data about the problems. Information about problems are mostly collected the organization's surroundings. The main objective of this phase is to evaluate its surroundings of the system. During research phase, the information prepared for MIS and the information collected during the day will be reviewed. At this stage, MIS helps administrators, the decision-makers, for submission and storage of information and, when needed for management processes, transmission of information and reporting procedures. Review phase is to determine solutions of problems by analyzing them. Review phase covers finding proposed solutions to the problems. At this stage, the information obtained is analyzed with decision models in MIS and alternative solutions are found. The important point in the selection phase is to select the most appropriate way of the solution of problem after finding several solutions by first analyzing the problem in the review process. After selecting the appropriate solution, information collected through MIS is evaluated, edited and then stored for reuse in similar situations. Implementation is the stage to decide to put the appropriate solution in process to resolve the problem. At this stage, an analysis is conducted to determine how adequate and accurate the appropriate solution method to resolve the problem is. During control phase the problems encountered during the implementation phase is analyzed and if exists, deficiencies are tried to be solved in the implementation. Due to differences in necessities, MIS ensures managers at different levels in an organization (strategic, tactical and operational) to access reports and summaries prepared on basic actions of organization by instantly accessing important records of the organization and serves to management level of the organization. (Anameric, 2005)

4. Conclusion

Today’s enterprises are obligated to develop "an integrated information system" in order to cut their costs, delivery time, to increase quality and variety of their products. ERP systems help unleash the true

potential of companies by integrating business and management processes. In this study, how and in what direction ERP Systems affect the decision of the upper and middle level managers of businesses together with the effects of ERP systems on strategic knowledge management to make enterprises more innovative and competitively advantaged, transformable, and decisions based on ERP systems has been investigated. The role and the impacts of these systems on strategic information management and decision-making have been presented with both global and local business application examples. The importance of MIS has been exibited with its stages in detail. MIS ensures managers at different levels in an organization to access reports and summaries prepared on basic actions of organization through the information stored in the system.

References

Anameric, Hakan, "The Effect of Management Information Systems on Management Functions", (2005)

Anameriç, Hakan. " A Model of Management Information Systems and Libraries ". Ankara, (2003)

Ateş, Duygu. (2007), "MIS Overview of the Macro and Micro" Marmara University, Institute of Social Sciences, Department of Informatics.

Bensghir, Turksel Kaya. "Information Technology and Organizational Change". Ankara: TODAIE.(1996)

Davis, Gordon Bitter., "Encyclopedia Dictionary of Management Information System". Cambridge, Mass.: Blackvvell., (1997)

Dilek Demirhan," The Role of Strategic Information Systems Management and Obtaining Competitive Advantage "Ege Academic Review, 2002, vol. 2, issue 2, pages 117-124

Earl, Michael J., "Experiences in Strategic Information Systems Planning", MIS Quarterly, Vol.17, Is. 1, (1993)

Gök M. Şahin, "Factors affecting the Success of ERP Systems and its Effects to Firm Performance ", (2005)

Güleryüz, Ö., "Enterprise Resource Planning (ERP) and Enterprise Effects of Managerial Decisions", (2007)

Helo, P., Szekely, B., (2005)"Logistics Information Systems An Analysis of Software Solutions for Supply Chain Co-ordination" p.10.

Hitt, L. M., Wu, D.J, Zhou, X. "Investment in Enterprise Resource Planning: Business Impact and Productivity Measures", Journal of Management Information Systems, Summer 2002, Vol. 19, No. 1.

İnce Mehmet, Oktay Ercan, "Importance of Information as a Strategic Power and Information Management in Organizations ", (2006)

Kini, Ranjan B.,: "Strategic Information Systems", Information Systems Management,Vol.10, Is.4, s.17, (1993)

Laudon, KC, Laudon, jp, (1993). Business Information System, 2.Edition, Fort Worth, The Dryden Press, s.420.

Lucey, T., "Management Information System", 6 print., London, DP Publication Limited, p.1., (1991)

Martin, Christopher and POWELL,Philip., "Information Systems: A Management Perspective".London; New York: McGraw Hill Books Co.,(1992)

O'brein, James A. "Introduction to Information Systems", Irwin Mc-Graw Hill, Boston,(1997)

Öğüt, Adam. (2003). Management in the Information Age. Ankara: Nobel Kitabevi.s.37.

Palaniswamy R., Frank T., (2000) "Enhancing Performance With Manifacturing ERP Systems," Information Systems Management, v3, p.43

Peppard, Joe., "IT Strategy for Business", Pitman Publishing, New York.Vol.05, Is. IN4, ss.42.,(1993)

Postacı Talat, Belgin Önder, Erkan Turan Erman, "Enterprise Resource Planning (ERP) Applications in SME 's ", 2012

Poston, R., GRABSKİ, Severin; "Financial Impacts of Enterprise Resource Planning Implementations", International Journal of Accounting Information Systems, 2001, Vol. 2. P.272.

Sağsan Mustafa, " a Service Concept Without a Name, but with too much functions: Management Information System," 2002

Selimoğlu, Kardeş Seval. "Integration of Control Concept with Enterprise Resource Planning (ERP) Systems ", (2006)

Simon, Herbert Alexander."The New Science of Management Decision". New York: Harper, (1960)

Tiwana, Amrit., "Information Management". Istanbul: Dışbank Publications.s.80, (2003)

Ülgen, Hayri., "Computers in Business Management." Istanbul: Istanbul University Press,(1980)

Yozgat, Ugur., Management Information Systems-Management Information Systems, Istanbul, p. 80., (1998)