INFORMATION TECHNOLOGY

INFORMATION AND INFORMATION SYSTEMS AS KEYS TO SUCCESS

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Abstract: *Business has become so complex that it is very difficult to plan and manage the processes of an organization without the assistance of a modern, computer aided information system. Nowadays most enterprises (even small and middle-sized ones) depend on information and information systems. The concept of information has many interpretations, but generally it is more than data; it is processed data, which plays a vital role in the managerial decision-making. Information processing computer systems for all kinds of enterprises exist and these have several types depending on the many services they offer which usually makes them difficult to classify into one exact category. The implementation and use of these information systems have costs. The investment in IT should be justified which is not at all easy, because while the costs can be easily calculated, the benefits (faster information-flow, better decisions etc.) are, in many cases, only questionable and unpredictable advantages. Yet, computer supported information systems may contribute to corporate competitiveness if they are used properly.*
Keywords: *information, information system, corporate competitiveness*

Introduction

Enterprises depend on information and information systems nowadays. Business has become so complex that it is very difficult to plan and manage the processes of an organization without the assistance of a modern, computer aided information system.

The effective business information available at the proper time is not only necessary for success, but it is also a requirement for survival in today's rapidly changing environment (Lönnqvist–Pirttimäki 2006).

Information created from data is the heart of the organization. Without converting the data to the appropriate form, namely information, managers cannot make good decisions (Hannon 2005).

The concept of information

The interpretation of data and information and their relationship have been examined by several researchers for a long time. Although data and information are used as synonyms in everyday life and in several disciplines as well, many experts try to separate the two concepts in accordance with some aspects.

Data has many interpretations, but one can say that data is a symbol or symbol sequence which records certain features, facts in a form which is suitable for transfer, communication and storage for later possible use.

Researchers generally use the following characteristics to separate information from data:

- processing (Jánoki–Kocsis 1986; Tarnóczi 2008; Kacsukné–Kiss 2009),
- novelty, new knowledge (not only for a person, but even for a machine) (Berey–Dobos 1986; Gábor 1993; Tarnóczi 2008),
- reducing uncertainty (Tarnóczi 2008),
- communication (Boros 1995).

According to the "objective" information concept, information is absolute and neutral. It is unchanged during transmission; it is only the appearance that changes. Ignoring or misinterpreting information comes from the lack of understanding and misinterpretation can be avoided by training. Users can transfer or convert this absolute information without understanding its content and during its flow, the unchanged information can appear in different forms which can be: electronic (structured number and code-sets), voice (word of mouth, recording, music), image (hand-drawn, printed, photographic, digitized page) or text format (handwritten, printed). Contrary to this traditional approach of information, information is neither absolute nor permanent, according to the "subjective" information concept. By this interpretation there are elementary knowledge called data which are created as the results of measurement or experience. Data by themselves are only raw facts with no meaning and are transformed into information only within the observing person. So, information is not the same as a set of data; it is produced from data during an active process where the background knowledge of the data user plays a significant role, too. This background knowledge is also a set of information which gives the interpretation context of the new information. Based on this, information is the meaning of the data, the interpretation of the data in the context of some personal or organizational background knowledge. Information does not have its own physical appearance; thus, it can only be transmitted indirectly in various data formats (speech, writing, sounds, pictures, motion pictures etc.). During the communication processes, only data transmission is done and it is the data rather than the information which can be converted into different forms (Juhász 2011).

So, while the objective information concept assumes, that those taking part in the information-transmission are unable or do not need to correctly interpret the content of the information, according to the subjective concept, the information users have a main role in the creation of information.

Even if we consider data and information as two different concepts, separating them unequivocally from each other in everyday life may become very difficult, or as a matter of fact, impossible.

The role of information in decisions

The role of data and information in decision-making is obvious (Kacsukné–Kiss 2009; Horváth 2002). They have a defining role at all the stages of decision-making: The decision process is started by information-reception which indicates that there is a difference between the actual and the desired situation. This is followed by the gathering and analysis of the information enabling the identification of the situation. Setting the goals and the elaboration of action alternatives are also all based on information. And finally, executing, implementing decisions is – actually – transforming information into actions (Enyediné 1997).

Managers need information which optimally serve their decision-making. The quantity of information to be processed and the need of complex processing depend on many factors, such as the volume of the products or services produced or sold, the complexity of the resource allocating decisions, the number of customers, the increase of uncertainty of the business environment and the level of performance aspiration of the enterprise as well, etc. (King–Shuker 1987).

Information systems

Today, at the beginning of the 21st century, different computer types with different performances can be found in almost every area of our lives. Big, medium-sized and even small enterprises are all dependent on computers whether routine tasks, production, service or decision-making tasks are performed (Tarnóczi 2008).

An increasing amount of data and information must be collected, stored, transferred and processed and at the same time there is less and less time to do these tasks. Besides, the processing is becoming more and more complex. No information system can handle these tasks without computer support.

An information system is a collection of computer software and hardware which serves most of the information needs of the organization (Wallace–Kremzar 2006). It provides the necessary information for all levels of the management to supervise and control the activities which they are responsible for (Smyth 1977).

There are several factors which motivate company managers to implement and use computerized information systems. The motivation can come from external pressure, since the activity of the enterprise may be regulated by local and international regulations (McMeekin et al. 2006) which require the tracking of raw materials, products, trade of goods and financial transactions etc. The motivation can also come from internal pressure, as the management may think that the competitiveness of the organization may depend on the information and information system, so these have to be treated as priority resources. In this case, enterprises implement systems which make

possible the effective management of production processes, the support of logistics processes, accelerate accounting and finance processes, ensure the transparency of procurement and sales processes and, last but not least, support decision-making on all levels of the management (Akkerman–Donk 2008; Mangina–Vlachos 2005).

The enterprise managers have to recognize that, to run a firm efficiently, it is necessary to operate an information system which covers the entire business, provides support for administrative and production-related tasks and also provides tools for the various levels of leadership to make decisions.

Nowadays, however, it is not enough to entirely serve business needs. A modern information system should also contribute to the growth of the business. The general business requirements for today's information systems are: income generation, the improvement and automation of business processes, enhance efficiency, cultural change of the organization towards innovation and improvement of customer satisfaction (Danyi 2007).

The types of enterprise information systems

The evolution of information systems used in enterprises started in the 1950's and is still going on today. Initially, the goal was to process data and to increase the efficiency of work. This was followed by the appearance of systems serving management needs and, finally, such systems appeared where the main objective was to improve the organization's competitiveness (Wiseman 1985; Galliers–Somogyi 1987; Hirschheim et al. 1988; Kövesi 2007). These periods are not sharply separated from each other, they overlap and live together. Each technology is constantly evolving; new methods and techniques are built in or get attached (Tarnóczi 2008).

When categorizing information systems, we may encounter difficulties. This is partly due to the fact that several researchers, experts try to categorize these systems in different ways, and partly because the systems – equipped with the newer capabilities and using the newest results of science – can be placed in several groups. One possible categorization of the information systems used in business enterprises are (Gorry–Scott-Morton 1971; Long 1989; Reynolds 1991; Boros 1995; Roóz–Kozma 2000; Michelberger 2001; Berde et al. 2003; Chikán 2008):

Systems supporting operation:

- TPS (Transaction Processing System): This data processing system is crucial to the organization as it records, checks, stores and processes data, displays the results, enables data access with queries. It is the required base of all the other systems.
- PCS (Process Control System): This system is able to support manufacturing processes by managing the accompanying information, recording and processing data to support routine decisions. Supported

tasks include automatic monitoring of inventory, placing orders automatically and helping product management decisions, too.

- OAS (Office Automation System): It helps to perform administrative tasks, supports effective, real-time communication with staff and partners, keeps track of tasks, programmes, deadlines, partnerships etc. It can contain a simple word processor, a spreadsheet, a database management software, a presentation application and a statistical software as well.
- GS (Groupware System): It coordinates a team working on the same project or task. It organizes and even optimizes the use of available resources, optimizes the work process, monitors and alerts of deadlines, measures and evaluates performances. The result of the work is stored in a single database; all employees have access to the information necessary for their work. It can also help group decisions by supporting electronically managed brainstorming, voting and vote counting.
- WF (WorkFlow System): A workflow consists of a sequence of connected steps. Each step follows the previous one without delay or gap and ends just before the subsequent step may begin. Workflow management systems allow defining different workflows for different types of jobs or processes. At each stage of a workflow, one individual or group is responsible for a specific task. Once the task is complete, the workflow software ensures that the individuals responsible for the next task are notified and receive the data they need to execute their stage of the process. Workflow management systems also ensure that uncompleted tasks are followed up.
- DMS (Document Management System): Its main task is to handle unstructured information and documents. It is capable of storing a large quantity of different types of documents in a fast, accurate, flexible, and cost-effective way, it provides shared access to these documents and supports working in groups.
- SCM (Supply Chain Management): Supply chain management is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer, to wholesaler, to retailer and to consumer. Supply chain management involves coordinating and integrating these flows both within and among companies with an information system.
- CRM (Customer Relationship Management): This is about managing an organisation’s interactions with customers, clients, and sales prospects. It involves using technology and systems to organize,

automate, and synchronize business processes – principally sales activities, but also those for marketing, customer service, and technical support.

Systems supporting manager work:

- MIS (Management Information System): The basic aim of this system is to provide managers, middle managers with up to date information which inform them in every moment about the current performances, outputs, problems and situations requiring decisions.
- DSS, GDSS (Decision Support System): It uses some kind of mathematical, statistical optimization algorithm to carry out calculations based on different assumptions and provides alternatives. The decision-maker can get an immediate answer to "What if…" questions and can try to find the optimal solution to a problem.
- OLAP (On-line Analytical Processing): It combines the capabilities of the decision support systems and the management information systems. It enables managers and analysts to interactively manipulate and examine huge data sets stored on computer networks and determine the relationships, the extent of interdependence between the components.
- SIS (Strategic Information System): The main goal of this system is to provide information to improve the competitiveness of the organization and to make strategic decisions. Strategic information can usually be calculated with some kind of algorithm from the past and current data which come from the transaction processing system, the management information system and data warehouses.
- EIS (Executive Information System): It provides direct, immediate, easy and user-friendly access to information which plays a key role in reaching the organization's strategic goals. This is a very user-friendly system, requires virtually no training time and shows critical factors and expected trends graphically, on diagrams.

Systems supporting other, mixed tasks: These systems are suitable for serving operational tasks, serving the information needs of the different levels of the management or they support collaboration between different organizations.

- ES (Expert System): This system makes suggestions in a narrow topic, supports the suggestions with facts, justifies and explains the choice or offers solutions which are most likely correct in an uncertain situation. It can replace humans with its abilities, and thus automate the making of professional decisions.
- BIS (Business Information System): It supports operational tasks and business activities as well, provides all the information necessary for

market research, production, human resource management, finance and accounting. To some extent, it includes the functions of both the operational and the management information systems and provides useful information to all organizational levels.

- IIS (Integrated Information System): The operation efficiency of an organization depends on the performance of the different IT subsystems. If the various operation and management subsystems are treated and handled as a single unit, we can speak of an integrated system which combines all the information required for operations, control and decisions.
- IOS (Inter-Organizational Information System): There are a growing number of multinational organizations in the globalized world where electronic data exchange becomes more common. The information systems of the partner organizations get connected, some of their subsystems and data are shared (in compliance with access rights) making transaction operations, automatic monitoring and decision-making quicker and more efficient.

The above list is far from complete. Other system names also exist based on the provided services of the systems which are constantly developed and more and more systems with several features appear on the market to serve different type of demands and enterprises (Molnár 2007).

Develop or purchase?

An IT investment can be realized by developing a system from scratch, by buying a standard, finished package (with the necessary customization) or by purchasing the service (outsourcing) (Molnár 2002).

The advantage of the uniquely developed system is that it is completely customized and in the case of internal development, organization secrets will not leave the enterprise (Kiss 2007). The disadvantage is that the development, the implementation is slow and expensive (Michelberger 2002).

The advantage of the standard system is that the external experts developing the system have experience, thus the implementation is (relatively) fast, (relatively) cheap and the system contains built-in industrial experience (Krotos 2002). Reality shows, however, that even introducing a standard system may cause problems for the management and the organization, too: the parameterized systems may seem expensive, implementation may seem to require a lot of time, later modification may be difficult and they create value only after completion (Upton–Staats 2008). Still using these systems is more preferable nowadays, than unique developments.

In fact, one of the primary expectations of the managers – that the IT should operate seamlessly, unnoticed and cheaply (Danyi 2007), – can be

achieved by the outsourcing of IT. The disadvantage is, however, that the organization's internal information, the secrets may easily fell into foreign hands. In any case, some IT services can be used just like public utilities and the range of this kind of services will likely expand in the future.

Return on investment

Although there is usually a need for the implementation or the development of an information system, at the same time managers tend to wait in case of IT investments. The common causes for this are the lack of funds, the prices, the rapid pace of technological changes, the cumbersome integration, the resistance of the employees and the managers, the lack of IT skills, the data security and the shortcomings in legislation.

The implementation and operation of such systems requires considerable initial funds and then continuous financial expenditures and therefore return on investment of these systems is a critical issue for the enterprises, just as in the case of other types of investments (Zsótér–Túri 2017).

Systems with added information value are capable of delivering extra economic advantage to the business and its leaders, but only those investments will bring value which are used correctly. Otherwise there is no point in using the system (Kovács 2003).

Information systems accelerate the flow of information, which can cause success in business, but this advantage – the positive impact of fast information flow – is difficult to measure and quantify. In the case of an IT investment, typically only the costs can be determined in a concrete, measurable form, while the advantages can only be defined as easily arguable, indirect benefits. It is therefore not always advisable to implement information systems depending on the return of investment. Instead, it is advisable to examine the consequences of lack of investments in IT, because by not using a modern computer system, the company may lose its competitiveness (Hetyei 2009).

Some researches show that in some cases, there is no correlation between the effectiveness of the business organizations and their investment in IT (Pitlik 1996; Strassmann 1997), moreover, sometimes the opposite seems to happen: enterprises using modern technology do not perform better than their less developed competitors; this is called the "information technology productivity paradox". However, the main reason for this paradox is that the investments in IT intended to aid the operation and the decision-making in the company are used incorrectly.

Competitiveness

On the one hand, publications dealing with competitiveness in general do not mention information systems at all or mention them only indirectly (Chikán et al. 2006; Somogyi 2009; Csath 2010). The general definitions of corporate competitiveness assume the acquisition and then the efficient procession of

adequate quantity and quality of information which ensures the company's success through making the appropriate decisions. On the other hand, literature on information systems and information mention the essential role of these in competitiveness: (Jurasics 2007; Zoltayné et al. 2007; Molnár 2007)

- Data and information stored in data warehouses result in better decisions.
- Decisions supported by information and information systems also has an impact on corporate competitiveness by ensuring faster response to environmental changes.
- The economic organization which builds its corporate data system and telecommunications system will have competitive advantage.
- Information technology simplifies and streamlines corporate activities through the efficient management of information. The core benefits, by which it provides competitiveness: reduces production costs, helps to find potential market segments, improves internal and external communication.
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Conclusions

No matter, whether enterprise managers and employees like it or not, information processing became vital in the survival of every business organization. It should be treated just as important as the main activity of the enterprise.

There are a lot of information systems available to collect, process and store data and information for every type of enterprises. They "just" have to find the right one, suitable for their tasks and aspirations.

In the current, rapidly changing business environment the information system – that makes production and services more effective, provides information to the managers, supports decision-making – has become an indisputable determinant of competitiveness. However, ensuring a competitive advantage for a particular company depends on the proper use of IT.

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