

INFORMATION AND COMMUNICATION TECHNOLOGIES IN RELATION TO THE QUALITY OF INFORMATION AND KNOWLEDGE

Edita Silerova^{1*}, Jiri Vanek¹, Klara Hennyeyova², Eva Kanska¹

¹Faculty of Economics and Management, Czech University of Life Sciences, Kamýcka 129, Prague
16200, Czech Republic

²Faculty of Economics and Management, Slovak University of Agriculture, Trieda Andreja Hlinku 2
Nitra 94976, Slovak Republic

Abstract

Nowadays, it is necessary for every company to use modern information and communication technology (ICT) for its development and existence. For every company, one of the most important corporate resources is data and information. To process data and information, to increase competitiveness, companies must use a sufficiently developed information base. New information and communication technologies, specialized databases, information systems and the Internet make it possible to obtain the necessary information, analyze it and create qualified strategies and decisions. Nowadays, a company would not be able to achieve competitiveness without purposeful use of ICT. The paper deals with the theoretical issue of the integration of the informatics section into the organizational structure of the company, which will be followed by an examination of a selected sample of companies in the Czech Republic. The investigation will be focused on the analysis of the state of integration of the informatics department into the organizational structure of the monitored companies. At the same time, the amount of expenditure on all informatics in the monitored companies will be determined in connection with the method of managing informatics in the company. The theory indicates the correct inclusion of the informatics section as a separate organizational unit, whose head is directly included in top management. Data, information and knowledge are important for decision-making in all company departments. For a selected sample of companies, an investigation will be conducted into how data and information are obtained in the company. At the end of the contribution, theory and reality are compared on the selected sample and conclusions are suggested about the feasibility of including the informatics section in the organizational structure of the company in relation to the method of financing.

Keywords: data, information, knowledge, information systems, informatics management

1. INTRODUCTION

In today's society, data, information and especially knowledge play one of the most important roles in all decision-making processes of companies. We encounter information at every step. Society, companies and people are saturated with information. Information surrounds us and haunts us twenty-four hours a day - in the morning on the radio, on television, perhaps in a newspaper, all day long on the Internet, on billboards, on the streets, in the company after starting the computer. We are surrounded by such an amount of information that it is very difficult for us to process. In companies, the amount of data is growing every year in such an amount that in previous years was stored in approximately ten years. However, we do not need such volumes of data to make the right decisions, we need high-quality and correct data and information, which will be supplemented by the knowledge, most often of the recipients of the data and information. Without proper knowledge, an educated decision cannot be made.

Currently, all managers are aware that without data and information, it is impossible to make qualified decisions, model and simulate situations that will affect the competitiveness of companies, their position on the market and their progressiveness. The ability to make these decisions significantly supports the abilities of employees, their knowledge, especially in connection with the quality of stored data and information in the company's information systems. Information systems have become a strategic source of information.

Thus, information has become one of the most important company resources for company decision-making. The method of obtaining them depends on the storage of data and information, their processing methods, and the method of communication in individual companies. Companies must obtain internal and external information for their decisions. Internal information is from the internal environment, it is relatively easy to obtain. Internal information is information about the state of the company - e.g. information from the economic field, from HR, from production, from marketing. Internal information is necessary as background data for further decision-making. The quality and method of obtaining internal information is fully dependent on the quality of the company's information system and, of course, on the human factor. External information is not so easy to obtain, it is made up of information from the external environment, e.g. information about the market, about new production technologies and others. The external environment provides information through media companies (unselected information, targeted information) through websites and opportunities to gain knowledge from various informal sources. The company information system should be fully integrated and should respect the company processes of the different functional areas of the company. It cannot be created without a clearly defined global and information strategy. The information strategy is an important tool for investment in information systems and information and communication technologies not to be too big a bet with an uncertain outcome, with the result that companies do not become a punch in the hands of suppliers (Urban, 2004). The design of the information system must also fully respect the partial strategic concepts in the company. Any other approach is very risky. If the mentioned procedure (introduction of an information system without an information strategy) is not followed in the company, a number of problems occur in all companies. A basic condition for the successful implementation of a business strategy is a clear idea of what results ICT will be used for and how information systems will be used. The information systems used in companies are very complicated, they are made up of a huge functional spectrum, they often do not have well-developed user manuals, the management of the informatics section is not at the right managerial level. The quality of the entire life cycle of the information system is strongly influenced by the way IT is managed in the company, especially the initial phase of the life cycle of the information system, then the process of testing and implementation and the actual operation.

The quality of the management process in the company is fully dependent on the way and ability to obtain information and further work with it. There are many ways to get information from corporate data sources. Haikun et al. (2021) "Management system was designed to realize the acquisition, transmission, storage, and management of information, and upload the data to the cloud database to increase the flexibility and scalability of the system". Information and communication technologies, as well as approaches to obtaining information about the status of a given issue, are developing rapidly. Information has gradually become a highly sought after commodity and, along with land, labor and capital, it is becoming one of the most important corporate resources. Nowadays, success or failure in business is increasingly determined by the right information and knowledge, which we use to evaluate it. Pour et al (2015) states that storage of data, information and knowledge must be given maximum attention. A small number of companies have knowledge stored in company databases (in knowledge databases) with the possibility of using them for further processing of data and information. Those who can use the available information correctly have a strategic advantage over others who do not have the necessary information and knowledge. Knowledge management begins with the identification of information resources and reusable knowledge that have value in meeting the organization's strategic goals. Knowledge sources can be found both inside and outside the organization. The next step of working with knowledge in the organization is the creation of a plan for the use of identified sources of information and knowledge, the creation of a definition of the environment where the knowledge will be applied. Knowledge can be continuously created and stored in the organization's information system. In this way, there is feedback with the knowledge used and thus the knowledge is enriched by further experience. Nowadays, artificial intelligence helps to use already existing stored knowledge. When managing a company and making decisions about its further development, we must not forget "common sense" when using data, information and knowledge.

The development in the field of information systems and information and communication technologies has reached a special situation in recent years. Worldwide statistics show that spending on information

technology and information systems is constantly increasing, and managers complain that these investments are not bringing them the desired benefit. Most often, when deciding on a new investment in IS/ICT, managers ask the following questions: how much will we spend in total on information systems and information and communication technologies, how effective will our expenditures be, will the return on investment be satisfactory, can information systems and information and communication technologies be used as competitive advantage and a number of other similar questions.

It is very difficult to answer these questions, because the time period is not specified, the use of data and information, which is the most important resource obtained from information systems, is not clear. Businesses currently need to invest in IS/ICT to gain a competitive advantage more than ever before – customers are constantly more demanding, the influence of global competition is greater, the emergence of new markets forces managers to need more and more high-quality information. Huge volumes of data are stored in the databases of information systems. The ability to obtain this data and further work with it is fully in the hands of the workers who need this data. They must be able to define this need and then use the data. All of this strongly affects all expenses associated with the entire life cycle (with the acquisition of the information system, as well as its use). Badawy et al. (2016) deals with determining indicators and parameters for selection.

The aim of the contribution is to confirm or refute the established hypotheses:

H1 - assumes that companies that have IT management in top management more efficiently spend financial resources on information systems and information and communication technologies.

H2 – assumes that there is an increase in the use of Business Intelligence software and thus better management support.

2. MATERIALS AND METHODS

2.1. Materials

Information systems and information and communication technologies are an important source of a company's competitiveness. An information system can be defined as any system, e.g. according to Habr and Vepřek (1986) "a system is a purpose-defined set of elements and a set of links between them". The quality of any information system and the method of obtaining information is determined by a number of factors, it can be judged according to measurable and non-measurable factors. One of the non-measurable factors is the quality of the information and knowledge provided for management. This indicator is related to the ability of users to follow the requirements of their needs and the ability to use and work with information. The quality of the entire information system is fully dependent on the ability to manage the informatics department, to manage the creation of information strategy, the architecture of information systems and the entire life cycle of the information system. The goal of the contribution is to meet the requirements for the organizational structure of the company following the inclusion of a senior IT department employee and higher financial resources spent on informatics. on the senior inclusion of an employee of the IT department in the organizational structure of the company in relation to the regular annual expenses to the actual annual expenses on informatics and methods of obtaining information of future ages within the framework of the survey carried out on a selected sample of companies. On the basis of a regular repeated examination in a selected sample of companies, the optimal inclusion of the executive in the organizational structure will be proposed.

2.2. Methods

The article was prepared on the basis of scientific methods - using holistic methodology, analysis, synthesis, induction and deduction. The theoretical part was prepared on the basis of the study of scientific and professional literature, the study of secondary literary sources. Based on the established hypotheses and the obtained results of the investigation, their evaluation will be carried out and proposals for further use will be made. The basic object of investigation is large and medium-sized enterprises.

3. RESULTS

A range of information, both external and of course also internal, creates requirements for their quality assurance. It requires effective setup of internal company channels, proper data aggregation and determination of distinguishing values. Correctly set processes in the company are supported by various modules of the information system and associated organizational procedures for the purpose of optimization and exchange of data, information and knowledge between individual organizational units of the company. The quality of this process depends on the management of the company department, which ensures the development and management of information systems and information and communication technologies. Long-term storage of large volumes of data in companies, their utilization and further processing depend on the quality and functionality of the information system, which is influenced by the quality of the entire controlling process of informatics in the company (Šilerová et al., 2017). The quality of the obtained information is fully dependent on the quality of the entire process of working with information - the method of obtaining it, the quality of processing and especially the ability to further work with data and information. Palmer and Waver (2000) address the necessity of data and information management throughout the decision-making process. The data, information and knowledge gained throughout the decision-making process is the most important factor. More and more companies are trying to adapt new business techniques as well as innovations in the form of technologies to more effective strategic management. Hallová & Hanova (2019) confirm that the use of specific information and communication technologies significantly increases the precondition for the success of companies in economic activity.

In a number of large companies, a member of the top management is an employee who is fully responsible for the management of the IT department. The ability to use the entire information system with all its designed functionality is then much more effective than when the management of the informatics department is part of another department - e.g. economic, technical and others. The internal processing of information (production, outputs, income, buyers, suppliers) is fully dependent on the credibility of their investigation, processing and presentation - using images, tables, etc. Employees use the above outputs for their decisions, the quality of the implemented decision is fully dependent on the quality of the outputs and the abilities of managerial staff to use them. Of course, the right decision is also influenced by external information. "Today, IS management is a specific, but nevertheless integral part of corporate management. Understanding informatics as a purely service activity brings a number of problems for the further development of the company, as well as the superiority of the informatics department over all other departments. In large companies, the information manager is often understood as a "second function" after the CEO. However, this situation is not ideal, because it can appear as a superior department to others and therefore the position of informatics in the company has a more important function" (Sodomka, 2006).

Two surveys were conducted. The first in 2020 and the second in 2021. The surveys were conducted on a randomly selected sample of companies. Medium and large companies were monitored. The investigation was focused on finding out where the IT department is located in the organizational structure of the company, how much the company spends on informatics annually and how company managers obtain information for management. Investigations were carried out in 148 companies. Respondents answered questions about who manages the IT department in the company, the difference between actual annual expenses and planned annual expenses, how data and information are obtained in the company for their further use.

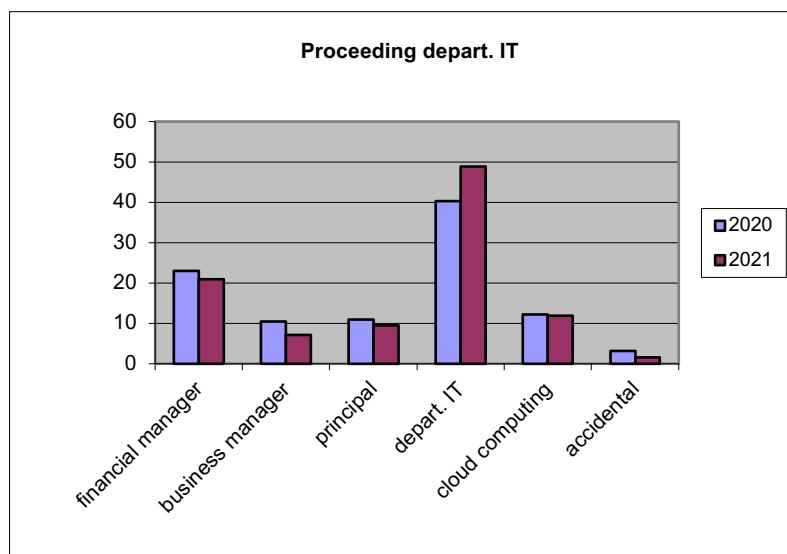


Fig. 1. Inclusion of informatics in the organizational structure

Source: own source of inquiry

Figure 1 shows the obvious answer to the question of the organizational inclusion of the IT department in the monitored companies - the inclusion of the informatics department in the organizational structure varies considerably in individual companies. In large companies, the IT department is often an autonomous department whose manager is in top management - 40.26% in 2020, in 2021 it is 48.83%. Historically, one of the largest inclusions of the IT section is within the economic section - 22.97% in 2020, there was no big change in 2021 - 20.97%. Historically, the largest volumes of data were processed in the economic department, which is also why informatics management still remains in this department. The percentage of cloud computing IT management from companies is also relatively high, in 2020 it was 12.16%, in 2021 it was 14.82%. Tvrdíková (2016) states that it is possible to use a cloud solution, but here the problem arises that we release data outside the company, we use applications stored outside the company. So the data travels in space and we don't have 100% control over it.

The further inclusion of the informatics department in the organizational structure of the company is completely random and depends on how the company developed, who was responsible for informatics and, of course, often the owners of the IT departments keep their competence. Molnár (1992) suggests the ideal placement of the information manager in the organizational structure.

The question for confirming or refuting the second hypothesis was - how do company managers get information for management.

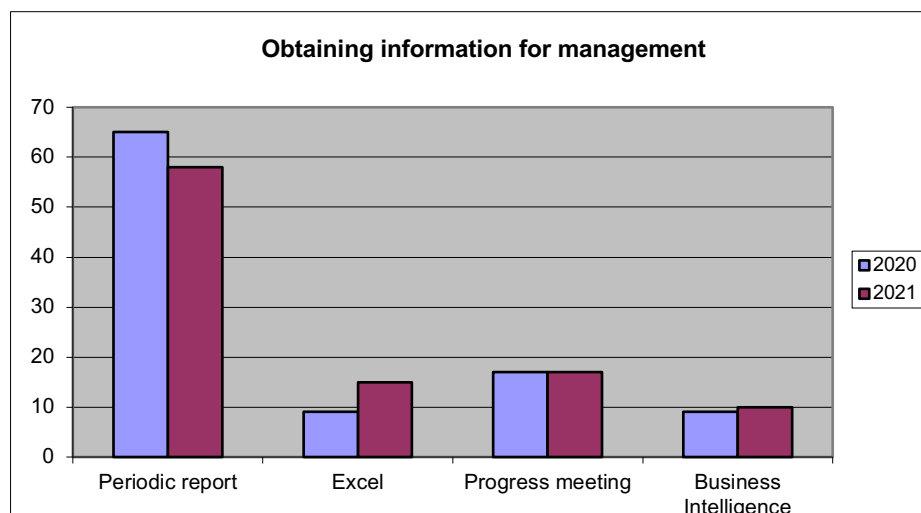


Fig. 2. Obtaining information for management

Source: own source of inquiry

Figure 2 illustrates how workers obtain information from their information systems. The highest percentage of executives obtain information for their decisions through regular reports. Compared to 2020, there was a slight decrease in 2021 from 65% to 58%. The disadvantage of regular reports is that they are static, current at a specific date and time. The timeliness of data and information depends on the type of business, the length of the update interval. Consultations are important all the time when it comes to getting information. Data and information stored in the information system are gradually used online. The percentage of their acquisition using Excel is increasing due to the easier availability of this software and the sufficient knowledge of workers to use it. A very good way to work with data and information is to use the Business Intelligence module. However, its price affects a number of companies when purchasing it. Polakovič et al (2018) deals with working with information and the method of obtaining it.

As part of the open question, a question was asked whether the amount of funds spent annually is fully correlated with the annual funding plan of the IT department. The question was answered by company employees who manage the informatics department. The set annual plan was created in companies where the informatics department was an independent department, was managed by an economic department, a commercial department, a technical department, used cloud computing services, or was managed by the owner himself. In the monitored sample of companies, the annual IT financing plan was not created for another method of IT management.

Company department	Difference from plan
Informatics	+ - 5 %
Economics	-10 – 20 %
Owner	+ 3 – 5 %
Business	+ 25 – 26 %
Cloud computing	+ 3 – 5 %

Table 1. Difference from the financing plan

Source: own source of inquiry

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4. DISCUSSION

Information needs in companies and institutions depend on the focus of their activities and the position of workers who use information resources as a management and planning tool. The focus of the activities of companies and institutions is determined by the established strategy and goals of each entity in the long term. The aim of the informatics department is to provide company employees with the right information at the right time. If the IT department is included in the organizational structure at the right level of management, if appropriate management methods and procedures are used, then information and knowledge will reach the right user in time. The method of management of the informatics department is also reflected in the demands for financing the entire life cycle of the information system, in the requirements for the knowledge of users when using the information system. The quality of the information system and the information provided is fully dependent on the manner and quality of management of the IT department. Companies must build a system that allows managers to develop their questions based on a specific situation: 1. information obtained on the basis of the context - managers should have information regarding the immediate situation of the given department and the problem to be solved for effective decision-making 2. individually created outputs (reports) – every manager must have specially addressed outputs to be able to act based on the current situation 3. creating rules and procedures based on knowledge and experience.

In order to create a paradigm that forms corporate values, it is necessary to create an information infrastructure that respects the central role of managers. They should be able to make a personal choice as to how they would like to participate in the creation of this corporate value. "The amount of data that occurs in information systems is mostly unclear without prior processing, information overload occurs for managers, and the result from the use of ICT does not meet the expected assumptions." (Svozilová, 2011).

The informatics department should be managed by an information manager who is very familiar with the issues of the company and is well versed in the field of information systems and information and communication technologies. The information manager should know the processes taking place in the company, the functions that these processes consist of. Basl and Blažíček (2008) deal with the qualification of information managers, their knowledge and abilities. In most cases, the information manager's qualifications should be closer to business orientation than to the information technology itself. The above can have a positive effect on the quality of the entire information system in the future, of course he should also have a very good understanding of information and communication technologies, the entire life cycle of information systems. It is necessary for him to be a sufficient authority and be able to discuss professionally with representatives of individual departments of the company, not only in the field of ICT.

Managing the ICT department in a company is very demanding. In many cases when problems occur with information systems, full responsibility is transferred to the information manager. Unfortunately, most of the problems are very often due to wrong specification, wrong definition of requirements, problems in establishing company processes, inconsistency in the terminology used, neglect of the primary user in the team and other problems depending on the situation in each company. For the above reasons, it is very important to pay close attention to the entire process of managing the life cycle of the information system. "Informatics" must be carefully attended to by the entire top management of the company, which is responsible for the quality of the information system, cooperation between individual departments must take place according to the management structure - strategic, tactical, operative. A

climate supporting the development, operation and quality of the entire information system must be created in the company.

The way IT is managed has a great influence on the amount of financial resources spent annually in the field of information systems and information and communication technologies. On the basis of the conducted investigation, it was found that of the companies that plan the annual expenses of the informatics department, the annual expenses are closest to the plan in companies where there is a separate informatics department, where the owner manages the informatics himself and where cloud computing services are used. In companies where the informatics department is a separate department, 23% of respondents saw a decrease in actual expenses by 3-5%.

5. CONCLUSIONS

From the conducted investigation, H1 was confirmed. For H1, it was determined that it is more economically efficient if the informatics department is a separate department directly in top management. In the monitored sample of companies, it was found that if the informatics department is a separate department, the funds actually spent on information systems are most correlated with the plan. Funds are used very well in the monitored years also when using cloud computing and IT management by the owner. In this case, especially for medium-sized enterprises.

It was not confirmed for H2. Business Intelligence software is not the most used software for processing data and information among the surveyed respondents. Excel is still the most used software for processing data and information among the monitored respondents. The advantage of Excel is that most users can work well with it and use the necessary functionality. Stail and Reaynolds (2011) state that the quality of the information system, and therefore the quality of the data obtained, depends on the quality of the information system.

An information system usually does not represent any economic benefit by itself. Only targeted use and real evaluation of information can bring effects. Only specific economically quantified goals, Achieving these goals can clearly demonstrate the economic benefit of such an investment. This is precisely what data and information obtained from company databases are used for.

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