"Journal of Economics and Social Sciences"

Types of information systems and technologies of a company

Tomsk Polytechnic University

Elena Ershova[a], Irina Nikulina[b], Magipervas Abushaeva[c]

[a] Institute of Humanities, Social Sciences and Technologies, Tomsk Polytechnic University
[b] Institute of Humanities, Social Sciences and Technologies, Tomsk Polytechnic University
[c] Institute of Humanities, Social Sciences and Technologies, Tomsk Polytechnic University

Abstract

Nowadays in the age of global economy, information becomes a key resource of management and can be determined as a key competitive advantage of a company. For most businesses, there is a variety of requirements for information. The paper presents types of information systems and technologies in the effective administrative decision-making that promotes increase of a company's competitiveness. The emphasis is placed on types of information systems at different levels of management and their functional mission from the point of view of administrative decisions made at a particular level of management. Various researchers have given classifications of information systems and technologies, but their classifications have no integrity. The author proposes a generalized classification of information systems and technologies, based on different studies, theories, methodologies.

Keywords: Information systems, information technologies, classification of information systems and technologies, management.

1. Introduction

Effective management needs a more detailed study of information systems and technologies. C. Shannon and R. Hartley laid fundamentals of the theory of information. They defined information as facts that reduce uncertainty. The most famous scientists and economists who study information systems are P. Seddon, W. Delone and R. McLean, J. Baroudi and W. Orlikowski.

In general, information system is an integrated and co-ordinate network of components, which combine data conversion into information. An information system is made up of five components: hardware, software, database, network and people. These five components integrate to perform input, process, output, feedback and control [1, 4, 8].

For most businesses, there is a variety of requirements for information. Senior managers need information to help with their business planning. Middle management need more detailed information to help them monitor and control business activities. Employees with operational roles need information to help them carry out their duties. As a result, businesses tend to have several information systems operating at the same time [5].

2. Materials and methods

Any classification requires consideration of the most important signs. Most of the known classifications are based on division of objects and characteristics and their regrouping with the help of the generalized model. Typology and type of information system or information technology depend primarily on two criterias: who use it and on what level of corporate structure they operate. These points determine the created classification.

3. Results

Types of information systems of most organizations are presented in Table 1. According to the table, an organization has several management levels. Each level is served by information system depending on the type of management decisions.

Table 1 – Types of information systems of company (Source: compiled by authors in [2, 3, 6, 7])

Types of information systems	Management level	Description
Strategic information systems	Top management	Systems that act as a tool of assistance to senior executives. The responsibility of these managers is to prepare strategic studies and to implement changes in accordance with the existing strategic opportunity of the organization. These systems have a powerful analytical apparatus with a number of models. As a rule, such activity signifies a long-term perspective.
Management information systems	Middle management	Systems for controlling, decision-making and administrative activities of middle managers. These systems analyse and determine the work level of objects, and periodically inform managers about its condition. Management information systems usually take data from the transaction processing systems and summarise it into series of management reports.
Knowledge information systems	Knowledge and data workers	Systems that exist to help knowledge workers and data handlers to integrate new knowledge into business (which can then be shared by other people in the organization to create further commercial opportunities) and to manage the flow of documents.

Transaction processing information systems	Operational workers	Systems that support operations managers to keep track of simple actions such as sales, payments, cashing payroll and so on. The main objective of these systems is to answer routine questions and conduct transactions flow efficiently and accurately.

Modern information technologies, in turn, also have different specific characteristics and are classified according to the types of information systems, where they can be used. Thus, the main types of information technologies are the following:

1. Information technologies of data processing are used to solve well formalized tasks having all the necessary incoming data. The main purpose of these technologies is optimization of recurring routine transactions and transferring their execution in automatic mode. The main processes of these technologies are data collection and processing, information storage, intermediate documents creation;

2. Information technologies of management are used to perform operations of less structured tasks. The main components of these technologies are database, the main direction is the formation of different reports. Materials must contain overall trends of data changes, the key reasons for the deviations appeared, general tips and notes on possible solutions;

3. Information technologies of automated office organize and support communication processes both within and out of the company. Such technologies are based on computer networks and other modern telecommunications;

4. Internet technologies also present an important element of modern corporate information systems. Obviously, it is very important to give priority to software while selecting the components of the corporate information system, because it supports all functional opportunities of the Internet browser. The use of Web technologies makes corporate systems more flexible, faster and more convenient. These technologies reduce the level of investments in additional system administration, technical support, organization of protection and safety information;

5. Special software and hardware protection systems provide the reliability of the Internet technologies use, namely the corporate information system safety. These tools allow one to bring encrypted data, support the use of electronic security certificates, the digital signature of users and, in addition, can perform client authentication based on a decentralized system of authorization;

6. Technologies of expert systems and decision support work with poorly formalized or unstructured tasks. Their main functional characteristics are: the possibility of mathematical modeling based on forecasting and planning, use of logical systems of advice and recommendations based on expert knowledge, a high level of adaptation in accordance with the criterias of use. Expert system technologies are commonly used to work with issues in specialized areas, and allow using expert advice specific to certain situations. Decision support technologies are often used to solve non-standard, difficult problems. These technologies help managers to determine the type and sequence of administrative actions based not only on their own experience and intuition, but also on reliable information [3, 6, 7].

4. Conclusion

The classification of information systems and technologies can be made using different methods, various schemes and principles of grouping.

The presented classification shows that information systems and technologies participate in all types of business processes on all levels of corporate structure.

Information systems and information technologies performance can be evaluated by creating uniform criteria of their classification. The proposed variant of generalized classification of information systems and technologies allows us to understand the importance of using various technologies and systems depending on the management level and the objective of its activity.

The value of the paper is that the developed classification covers all management levels of a company and characterizes information systems and technologies for each of them. Moreover, it has a significant practical importance, since it shows detailed work of various technologies that can help managers in decision-making and companies in their competitiveness growth.

References

1. Averchenkov, V.I. (2011). Information systems in production and economy. Moscow: FLINTA. P.274.
2. Chumyakina, T.A., Nikitina, Ju,A., Zeremskaya, Ju.A. (2012). Definition of strategic management. *Journal of Economics and Social Sciences.* No. 4 [available at: jess.esrae.ru/6-72] [viewed on 20/03/2015].
3. Collins, J. (2013). *Types of Information Systems - Components and Classification of Information systems.* http://www.managementstudyguide.com/types-of-information-systems.htm. [accessed 11/03/2015].
4. Dahling, R. (1957). Shannon's Information Theory: the Spread of an Idea. Department of Communication and Journalism, Stanford University. [available at: http://books.google.ru/books/about/Shannon_s_Information_Theory_the_Spread.html?id=upcUAAAAIAAJ&redir_esc=y] [viewed on 12/03/2015].
5. Ispravnikov, A.A., Dmitrienko, N.A., Serkova, N.V. (2013). Sources of competitive advantages of the company. *Journal of Economics and Social Sciences.* No. 2 [available at: jess.esrae.ru/4-42] [viewed on 20/03/2015].
6. Petter, S., DeLone, W., McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of Information Systems.* No. 17.
7. Rilley, J. (2012). *Types of information systems.* http://tutor2u.net/business/ict/intro_information_system_types.htm. [accessed 11/03/2015].
8. Saak, A.E., Pahomov, E.V., Tyushnyakov, V.N. (2013). Management information technologies. Saint Petersburg.