

Management of Systems from a Cybernetic Perspective

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Abstract

Systemic development involves moving to a higher level of the evolution of any entity in the real world and the existence of an evaluation and analysis activity. An important feature of the contemporary era is the development of scientific frontier disciplines, through which an attempt is made to increase the complexity of the economic-social realities, which requires interactive, multidisciplinary approaches. The development of information and communication technologies has allowed, both on a global level and in our country, the emergence of new concepts and methodologies in the field of economic informatics, which try to respond to the need for a deep revolution and with important implications in the computerization of the managerial process, both by using more effectively of the IT tools in organizations, as well as by solving the most operative problems of complex management. This is why it is important to highlight the major role of systems from a cyber perspective in the activity of organizations and to emphasize the importance of having basic knowledge about them. The main purpose of the article is to identify the roles of systems in organizations from a cyber perspective.

Key words: system, management, information, information system, user

J.E.L. classification: M15

1. Introduction

Management - because management science and the economic framework are fundamental aspects for the existence of any society, which includes and reflects at the same time resonances in the area of industry, agriculture, tourism, trade, services, etc. Last but not least, the impact of economics on the production and use of information, the technology of communications and new opportunities offered by the forms of work specific to the information society and knowledge: telework, teleservices, telecommerce, teleeducation, telemedicine, etc. Without claiming to make a thorough incursion into economic theories, the present work can be a starting point in identifying the economic implications, determined by the functioning at the level of an organization of a performance information system, well developed and well exploited (Nickols, 2002).

System - because any court in the environment is a system, from microorganisms to social, philosophical and even virtual constructions. All the more so a lot of information, decisions, individuals, etc. is a system (Orlikowski and Baroudi, 1991).

Informational - because it concerns information and how it is formed, used and stored, in a word the life cycle. In this case, the informational includes computer science, which automatically implies the consideration of information and communications technology, both as a means of obtaining and transmitting information, but, especially, as a new paradigm in the development of modern organizations, specific to the information society based on knowledge. We talk here about the virtual office, the virtual enterprise, the virtual corporation, the virtual university - understood not in the sense of their non-existence, but in the sense of building and functioning within the global Internet

network (Orlikowski and Baroudi, 1991).

The tendency to apply to one science the method of another science is a characteristic feature for the whole history of the development of scientific research. The explanation of the tendency lies, on the one hand, in the impact that the explosive progress of one science has on other sciences at one time, and, on the other, in the custom of using methods or models verified by obtaining good results in different other scientific fields (Kahn *et al.*, 2002).

Thus, regarding the problem of method in the science of economics can be mentioned philosophical, physico-mechanistic, bio-organic or psychological approaches. For example, a physico-mechanistic conception regards the economic phenomenon as a physical phenomenon, trying to apprehend laws and principles similar to those in physics, especially quantum mechanics, in economics.

2. Relevant literature

The transition to the notion of system is demanded by the temporal perspective of the analysis of the respective phenomena and processes, which results in the conception of concepts regarding the economic, political, social system, etc. Generally speaking, a system is a set of elements, organized to achieve a certain objective (Kahn *et al.*, 2002).

Information systems are vital components of organizations, constituting an essential area of study for business management and administration, as necessary to the contemporary manager as disciplines such as marketing, accounting or finance. The paper proposes to the reader a gradual approach to the main concepts related to economic information systems. Thus, in one of the most general approaches we can define the system as any entity in real life, for which a set of components (phenomena, objects, processes, notions, concepts, entities or collectives) that are in both reciprocal relationships and which are identified are identified. and with the environment, and acting together to achieve well-established goals (Berners-Lee *et al.*, 2001).

In order to perceive the notion of information system as accurately as possible, a few basic definitions of the main components are needed (Constant *et al.*, 1996):

✓ **the information** is a novelty (reality, fact), to be introduced in a useful and understandable context. It gives value to the information for certain people and satisfies the specific information requirements. Thus, information is a basic resource that individuals and organizations must possess in order to survive and succeed in contemporary society, which gives importance to information systems;

✓ **the information** system represents the set of people, procedures and material and financial resources that collect, transform and disseminate the information in an organization. Contemporary economic organizations can implement several types of information systems, which include simple manual information systems (written information on paper), informal information systems (tacit and explicit information, shared within labor relations and organizational culture), and automated information systems. (which uses hardware, software and human resources to transform data into user information);

✓ **managerial information system** is a concept used to describe an information system that provides information in the form of standard and digital reports for the management system. Next, the concept of managerial information system will be used to describe a wide class of information systems designed to provide the information needed for managers' decisions. All these make the managerial information system a popular term in the field of information systems. As a result, the term is used by many organizations as a name for IT departments, as a name for, the information systems they develop, or as a name used by many universities for departments and academic programs in the field of information systems;

✓ **the user** is the person who uses either an information system or the information it produces. Typically, the term applies to most employees in an organization to distinguish them from the small number of information systems specialists (system analysts and professional programmers);

✓ **the managerial user** represents a manager, an entrepreneur or a specialist with managerial attributions, who uses the information system for the information needed to obtain the decision alternatives and to base the decisions.

Both in the specialized literature and in practice there are a multitude of criteria for the classification of systems. As a synthesis of these general criteria, the following types of systems are defined (Hali *et al.*, 2002):

1. Depending on their nature:

- natural systems (for example, living organisms);
- elaborated systems (technical, economic, conceptual).

2. After the operating mode:

- open systems (exits from the system do not influence inputs);
- closed systems (exits from the system influence the inputs).

3. After their behavior:

- deterministic systems;
- probabilistic systems.

In addition, from the perspective of the scientific approach, the types of information systems and the major roles they play in the operational, managerial and strategic success of an organization are highlighted. Information systems fulfill three roles in an organization, being (Berners-Lee *et al.*, 2001):

- support for business operations;
- support for decision-making management;
- support for strategic advantages

Each system has two defining characteristics: the structure of the system - which represents the set of relations between the components of the system, as well as the relations between components and the environment - and the state of the system - which constitutes the set of the characteristics of the system at a given time (Stoica, 2003).

The elements of the system can be real objects (a stock of products, a delay of production, a rhythm, a company, etc.), their dimensions depending on the level of detail existing. In these cases, the object-elements of the analyzed system can, in turn, be systems. Thus, the system represented by an organization is an element of the branch system which, in turn, is included in the national economy system (Orlikowski and Baroudi, 1991).

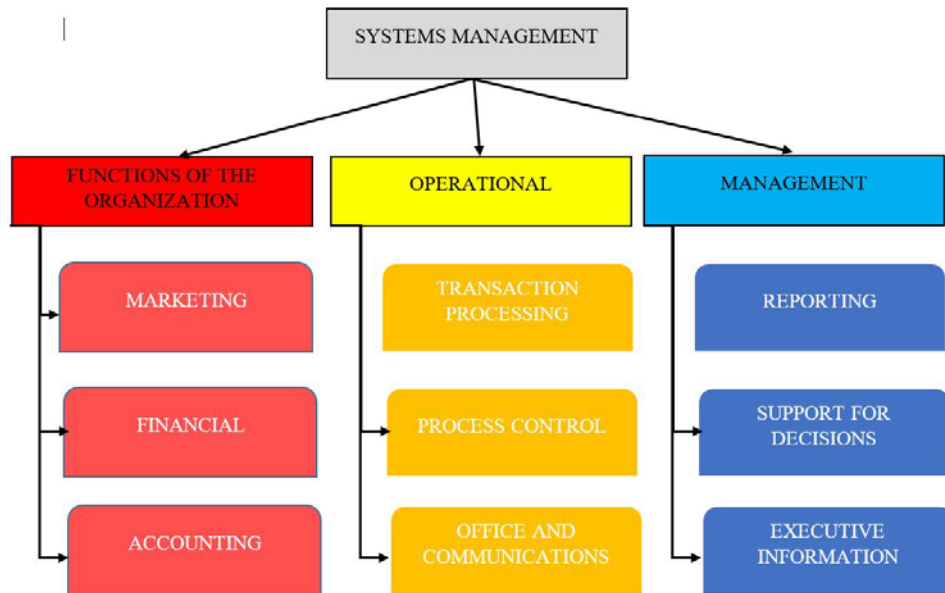
The objective of this study is to identify the roles of systems in organizations from a cyber perspective.

3. Research methodology

The main purpose of the research was to identify the roles and importance of systems in organizations from a cyber perspective. 150 employees from various organizations were involved in the research. The research study was based on the questionnaire and the sample size in this study was simple random sampling. In order to determine the validity of the questionnaire, a calculation method was used to calculate the coefficient alpha-Kronbach, whose variance was equal to 0.86. For data analysis, statistical methods have been used, such as the Friedman, Peonson and Spartan methods.

In the process of data analysis, systems management was approached as being composed of three subsystems: the functions of the organization, operational and managerial (Figure no. 1).

Figure no. 1 - Systems management



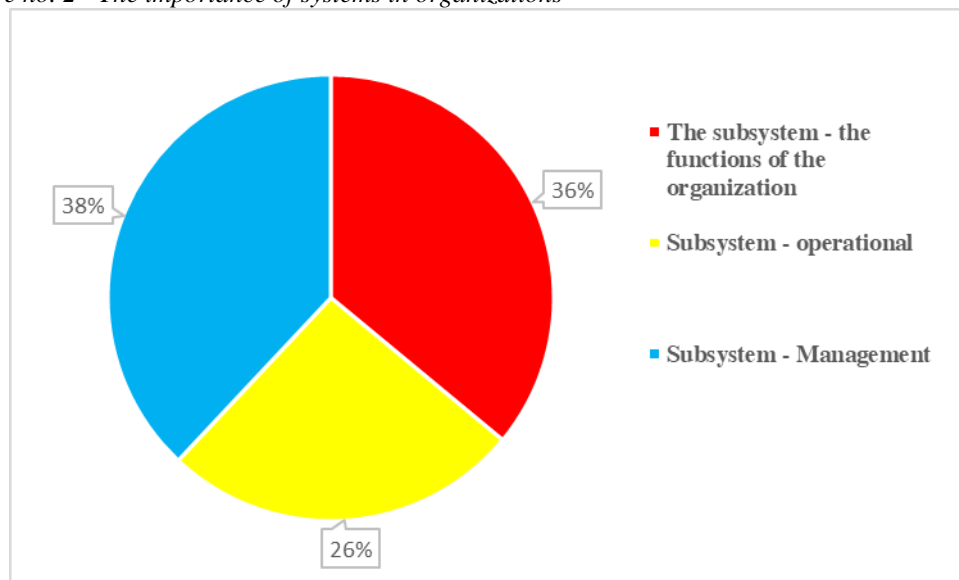
Source: Developed by authors through adaptation and processing after Baroudi *et al.*, 1996

All subsystems are in continuous interdependence. Changing one, most often, changes the other and this must be known by all managers. It is important for managers to know, be responsible and take account of these subsystems so as to ensure that the possibilities of reaching the organizations' objectives are increased.

4. Findings

The main results indicate that the managers of the organizations first consider the managerial subsystem, then the subsystem - the functions of the organization, and, finally, the operational subsystem (Figure no. 2).

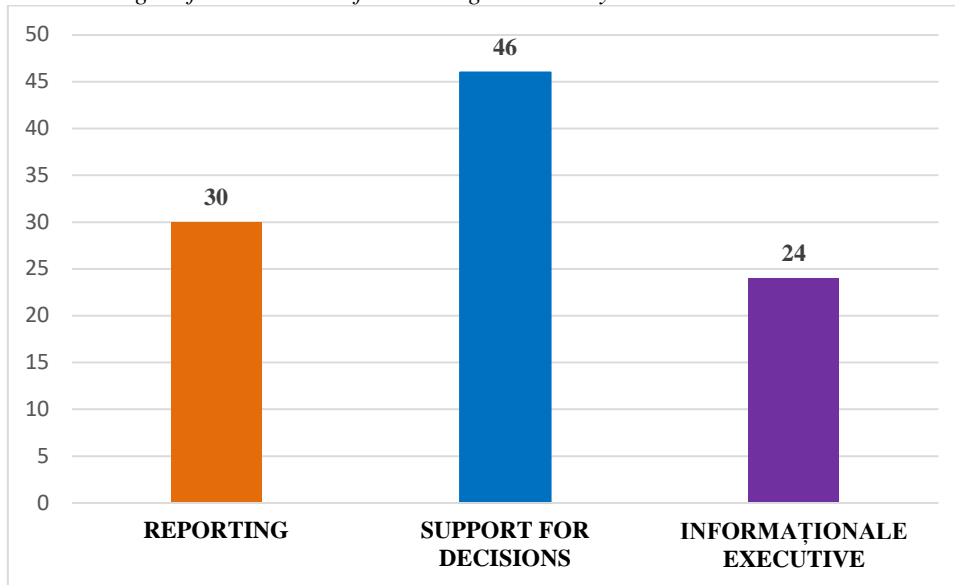
Figure no. 2 - The importance of systems in organizations



Source: developed by authors

We found that 38% of the managers interviewed appreciated that the **managerial subsystem** has the highest weight as importance, within the importance of the systems in the organization considering that the *decision support* (46%) plays an important role, followed by the *reporting process* (30%) and lastly the *executive information processes* (24%) - Figure no. 3.

Figure no. 3 - Weight of the elements of the management subsystem

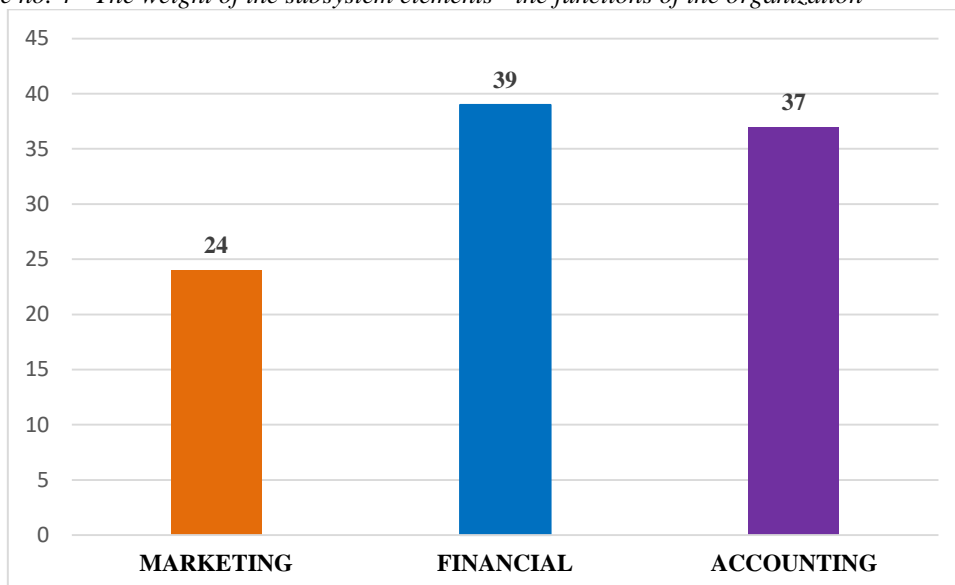


Source: developed by authors

The management systems provide information to support the decision-making activity. Managerial information systems are designed to provide accurate, timely and relevant information needed to make effective decisions.

In the second place as importance in the management of the systems, with 36%, the **subsystem - the functions of the organization**, were considered, considering that the *financial processes* (39%) play an important role, followed by the *accounting processes* (37%) and lastly *marketing* (24%) - Figure no. 4.

Figure no. 4 - The weight of the subsystem elements - the functions of the organization

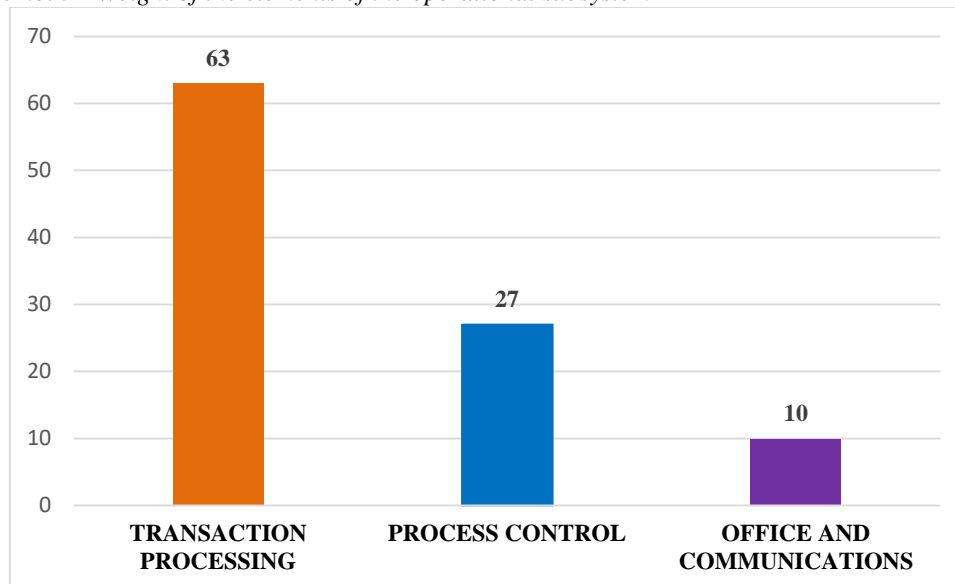


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Subsystem - The functions of the organization for a manager is important to understand that the information systems directly support the operational and managerial functions of the organization in accounting, finance, human resources, marketing and operational management.

On the last place were the operational subsystem, with 26%, as the major importance is primarily the processing of transactions (63%), followed by the control of processes (27%), office and communications (10%) - Figure no. 5.

Figure no. 5 - Weight of the elements of the operational subsystem



Source: developed by authors

Operational systems process data generated and used in business operations. Depending on their role, there are several categories: transaction processing systems - records and processes data resulting from transactions, updates databases and produces a variety of documents and reports; process control systems - provides operational decisions that control physical processes; automated service systems - those that support communications.

5. Conclusions

In order to explain the behavior of the economic system according to the organizational structure (their activities and connectivity) and the functional structure (control mechanism and decision-making policies) of the organization and to suggest the changes that lead to an improvement of the general behavior of the system, done dynamic analysis, based on system analysis, modeling method or simulation method. System analysis is one of the most important methods of system dynamics, because it allows precise definition of the objectives and limitations of the studied system, of the component elements, of the relations of interdependence between subsystems, as well as of the links with other systems from the external environment.

In addition to the general properties derived from belonging to the abstract category of system, the economic cyber systems also have specific characteristics, formulated as laws or principles of their organization and functioning. The laws of cyber systems remain valid, including in the case of the system represented by the economic organization and its information system. The characteristic of cyber systems, according to which the variety of the outputs of a system can be modified only by a sufficient variety of its inputs. Based on the law of the required variety, different types of behavior of dynamic systems are determined, such as economic systems.

Providing information and supporting the adoption of managerial decisions at all levels of management is a complex issue. Conceptually, several types of information systems are needed to support the responsibilities of managerial users.

Managerial information systems are designed to provide accurate, timely and relevant information needed to make effective decisions. The concept of managerial information system was developed to counter inefficient development and inefficient use of electronic computers.

The importance of managerial information systems lies in the fact that they emphasize the managerial orientation of the processing of business information. An important purpose of information systems based on information and communication technology is that of support for the management of decision making and not just the processing of the data generated by the operating system. This emphasizes that a systemic framework must be used to organize the activities and functions of information systems.

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