THE ROLE OF INFORMATION SYSTEMS IN ECONOMIC ORGANIZATIONS FOR THE STRATEGIC MANAGEMENT

Emilia VASILE, PhD Professor
Athenaeum University, Bucharest, Romania
rector@univath.ro

Dănuţ-Octavian SIMION, PhD Associate Professor
Athenaeum University, Bucharest, Romania
danut_so@yahoo.com

Abstract: *The paper presents the role of information systems in economic organizations for the strategic management. The leadership of the modern enterprise is no longer satisfied with operative information but wants forecasts, wishes to anticipate future competition movements and the future evolution of the market taking into account what is happening today. That's why even if we do not design decision-support systems, modern computer systems have to come out of the company's perimeter. The IT system detaches itself from the enterprise and even comes out of it by making a direct connection with banks, suppliers and providing leadership with information about the movements that competition is doing. Achieving good economic efficiency by businesses is conditional on the existence of a scientific leadership based on good knowledge of economic laws, the operative and accurate knowledge of supply and demand on the internal and external market, the dynamics of commodity prices, technological trends and the way to use the resources they have. The strategic management wants to use the benefits of a robust information system to take the best decisions for the oranizations. The IT system provides data from the operational level and is processing and aggregating the complex economical indicators to give the proper support to the decisional system lead by the top management.*

Keywords: *Information systems, business logic, IT systems, programing logic, informational support, mission-critical softwares, business decisions*
JEL Classification: *C23, C26, C38, C55, C81, C87*

1. Introduction

The fact that, on the one hand, mathematical models represent the scientific component of an information system, and on the other hand, taking into account the facilities offered by the use of information and communication technology (ICT) as a component of the information system, This is a real instrument in the scientific leadership of economic activity.

An organization must maintain appropriate relationships with other economic, political and social systems in its environment. The system group includes several factors such as customers, suppliers, competitors, shareholders, syndicate unions, financial institutions, government agencies and communities, each with its own objectives relative to the organization in question. Information systems are those that facilitate the interaction between the organization seen as a system and each of the listed factors.

Within the information process, the stages of the formation of economic information are carried out: collecting data from the direct productive process of the economic system, verification and transmission for the actual processing (regardless of the technical means), the formation of the economic information and its archiving (O' Brien & Marakas, 2017; Allen, 2016).

Some of the phases of the information process (eg collecting primary data) are carried out within the operational (driven) subsystem of the economic system. It can be appreciated that the subsystem in which the information process takes place together with a part of the operational subsystem forms the driven subsystem of the informational cybernetic system. The main role of the informational subsystem led is to provide information for the management of the whole economic system, for the functioning of the information system and for keeping it within predefined limits (Coleman, Pigman & Pulak, 2015; Swanson & Ramiller, 2016).

The second element of the information system is the managerial process of the system, which is based on specific management methods, similar to the management of the economic system as a whole. The management information subsystem has a special role, receiving information and requirements on the one hand, and on the other hand, passing on decisions. The information

requirements they receive aim to maintain and ensure full consistency between the economic system and the information system that characterizes it. The requirements are like creating new information, abandoning information that is no longer needed to drive the economic system, improving methodologies and for calculating indicators.

2. The IT system and the business components

The dynamic nature of the economic system necessarily determines the dynamics of the economic information system. Initially, variations in the behavior of the economic system may be perturbations for the information system, but due to its existence as a cybernetic system, the information system can adapt and function in full compliance with the economic system. The cybernetic character of the economic information system results from the fact that it has the ability to self-regulate, so it reflects and is always consistent with the economic system that it describes, characterizes and serves.

In this context one can define both the information system in general and the economic information system.

The informational system is a technical and organizational ensemble to conceive and obtain the information necessary to substantiate the decisions for the management of a certain field of activity (Gordon & Miller, 2016; Alter, 2016).

Here are some of the arguments put forward in favor of leading economic organizations using computer systems:

- SI offers the opportunity to simulate processes and economic phenomena at both microeconomic and macroeconomic level. Mathematical models for forecasting the development of the economy can be developed and implemented, different plan variants can be developed and then the optimal option can be chosen.
- At the microeconomic level, SI is harmoniously correlating the available resources with the proposed objectives. (Eg planning for capital revisions and repairs, order planning and production tracking, inventory management).
- through SI it is possible to implement the principle of selection and information by exception. By applying this principle it is ensured that decision makers are relieved of a series of data that are often „suffocating" and can not be used properly. Ex: We have a 15,000-item

and 15,000 item list of supplies - the idea is to only highlight products that deviate from the normal state (stocks outside the lower and upper alarm limits) in order to avoid breakage inventory or fixed assets assets - supernormal stocks.

- The higher the level of driving, the smaller the set of indicators and the indicators are more complex. Under the exception and selection principle, only those indicators that are necessary and sufficient for each decision level need to be selected.
- SI assures the implementation of a multitude of mathematical models and, as a result, will imply an increase in economic efficiency at the level of the reference unit. Ex: In the field of foreign trade it is possible to implement models regarding foreign market prospecting, correlation of export task with domestic production, calculation of economic efficiency on each commercial transaction, choice of optimal offer.
- By implementing the SI, labor anacronism is removed. For example, about 70-80% of the technical and civilian staff is used for routine activities (finding, recording, centralizing data on economic processes and phenomena) leaving too little time for control, analysis, forecasting and control activities . Due to SI usage, decision makers will have more time to analyze data and make the right decisions.

At micro and macroeconomic level, the design of computer systems should consider the use of databases, mathematical models, obtaining final situations with a pre-warning character of deviations from the normal state, all representing a scientific form of leadership. This conception changes the entire information system, transforming it from a passive instrument of finding, recording and analyzing already existing phenomena and processes into an active predictive, command and control tool.

Reporting systems provide managers with information that greatly supports decision-making needs by accessing databases with information about internal operations previously processed by transaction processing systems. The data on the business framework is obtained from external sources. Information accessible to managers includes reports provided on request, periodically - according to a predetermined schedule or under exceptional circumstances. For example, sales managers can access instantly generated reports in response to a request to analyze the sale of a particular product, weekly sales analysis reports to evaluate the results of product sales, agents

and sales areas or automated reports generated by each or a sales agent does not get the expected sales results over a specified period.

3. Development of information systems components

In the development of a computer system one can choose one of the following solutions: a centralized computer system and a decentralized computer system.

The centralized computer system is characterized by the fact that the entire process of data storage and processing, as well as system development, takes place at a single location where there is a single computing system, usually a mainframe that stores a base unique data as well as all application programs. Users interact with the system via terminals (which act as thin clients).

The advantages of centralization are represented by:

– effective control over the use and development of software;
– control over data security and integrity;
– Sharing hard, soft and data resources between users;
– eliminating the risk of hard and soft incompatibility within the system;
– Easily promote standards (technical, design, procedural, etc.) at the level of the whole system;
– providing services requested by users through the power of the central system (mainframe).

The disadvantages of centralization are the following:

– the „fall" of the computing system blocks all users;
– Alteration of data and programs, willful or accidental, affects all users
– the system may prove slow and inflexible to users' needs, often insufficiently adapted to local or group needs of users;
– can achieve a long response time for simultaneous requests from multiple users.

The decentralized computer system is characterized by the fact that the data, software and the power of calculations are dispersed in different locations (even geographically dispersed) of the organization. The processing is done on independent personal computers or within local networks (Allen, 2016; Gordon & Miller, 2016).

Advantages of decentralization:

– data is stored and processed locally;

– software is better suited to local needs;
– Hard, soft or database damage at a location does not affect other locations;
– the system configuration can be tailored to the needs of different departments within the organization or even local users;
– greater autonomy and motivation at the local user level.

Disadvantages of decentralization:
– large risks of hard and soft incompatibilities between different locations
– the inherent appearance of duplications of data and software in different locations;
– the difficulty of realizing complex projects at the local level;
– the risk of fragmentation of IT policy;
– higher costs compared to the centralized system.

The current trend is net-oriented towards decentralization, which must be achieved in such a way that:

• All responsibility and authority for the decentralized functions of SI to belong to local management;

• Ensure alignment with the standards used at the organization's overall SI level;

• At central level to be achieved:
- elaboration of strategy at the whole SI level of the organization;
- communication management within the organization's local network;
- data management;
- disaster recovery.

The architecture promoted in decentralized systems is the client-server architecture characterized by the fact that the applications and data made available to the users are dispersed on the different hardware depending on the number of users to access and the required computing power.

The design and optimization of the banking information system has to be carried out on three levels certain:

1. Decisional (management level).

2. Datawarehouse & Reporting (management level). At this level, the defined data structures allow a high level of performance of multiple requests. Every bank has multiple information about its customers. But this information is dispersed, managed by various applications.

Datawarehouse is a collection of detailed, high-value data from all relevant sources within the bank, enabling dynamic querying and analysis of information to support decision-making processes. This makes it possible to know the preferences regarding products and services, the behavior and the needs of the client. Data mining tools (assemblage of knowledge-based engine techniques - decision trees, neural networks - allowing large data volumes to be constructed, predictive models) allow for the discovery of significant trends or correlations by analyzing current data and historical customer reviews. The multidimensional analysis tools the datawarehouse provides for allows browsing through stored information and identifying the most complex and hidden correlations. They can be based on advanced technologies such as multidimensional databases, allowing data to be matched even on five analysis axes, with the possibility of successive focusing on the desired indicators.

3. The front-office / back-office. The client's relationship with the bank is done through the front office using phone support, paper, e-mail or web mail. The front office is the user interface. Call centers were the first front office solutions - based solely on telephone communication. These issues also apply to companies that have developed computer systems that support e-commerce as a direct, immediate, and personal relationship with the customer. Bank employees take customers' calls, answer questions, update their accounts, offer products and services. Today, the possibility of communicating using the Internet - via e-mail and web - has been expanded. Thus, multiple communication channels are available to customers: paper-based mail (still essential for back-office), fax, e-mail, web, telephone. The role of call centers has evolved and expanded. They have become competitive weapons in attracting new customers, keeping existing ones and increasing the bank's revenue. Their new goal, nowadays the customer interaction center, is to personalize the relationship with each client of the bank (O' Brien & Marakas, 2015; Swanson & Ramiller, 2016).

The key to reaching this new mandate is customer knowledge. This implies, on the one hand, the identification of the best customers and the provision of irreproachable services, knowing that 20% of the clients (the so-called gold customers) provide 70-80% of the bank's income. On the other hand, it is necessary to know the relationship in time with the client so that each contact with it represents a business opportunity (offering a new product or

service). This customer knowledge can be achieved by creating and using a data warehouse that stores information about customer transactions, products and services that they prefer, information on which to get a „portrait" and a description of customer behavior in relation with the bank. Interaction with the customer has evolved very dynamically in recent years. Today, when a customer calls the bank, smart switches called Automatic Call Distributors (ACDs) identify the caller, the software retrieves customer information and sends them to the employee of the receiving bank. Call routing technology applies customer defined bank management rules, identifying „gold customers", type of service requested, and employee of the bank (specialist in credit, forex, portfolio management, etc.) who need to take the call. In fact, the first call-to-call contact is made by the Voice Response Unit to determine the identity of the customer and the type of request.

The Middle Office is a distinct entity placed between the front and back office, allowing two-way data circulation between these two components. Middle office behaves like a router in terms of processing. Its main function is to transmit front office data (from various sources and thus multiple formats) to the back office. Middle office retains two separate data images:

- one corresponds to the front office that takes the data into their „native" format determined by the client's channel of distribution;
- records returned by the back office after data storage and processing.

Middle office therefore provides the platform for data reconciliation and reporting, while ensuring the control of data management risk. The risk is determined by obtaining data from a large number of other computer systems. Often these data are in different formats, from different databases, running on different hardware platforms and under different operating systems. This is why a lot of data extraction and „understanding" problems can arise due to the different format it presents. Data storage and processing is done in the back office, the place where TPSs are executed (transactional processes). Back office is the one that provides the front office with the requested information as a result of the fact that the applications and the database are here. An important issue is the realization of an integrated front office / back office solution that will allow, besides offering a multitude of communication channels to the client, routing customer calls to bank specialists and managing back office processes to meet customer demands (Coleman, 2015; Alter, 2016).

The new IT solutions implemented within the Banking SI have led to a real change in what we call organizational culture. New concepts such as groupware and workflow have been promoted.

The workflow aims to automate information (secure documents, images, composite documents) between different workstations. It is an interactive system that assures the development, execution, analysis and operational management of multi-user and multitask processes.

Groupware is a concept that promotes the idea of cooperative work using the intranet communication facilities.

Designing a new banking product requires cross-cutting and complementary skills. The intranet facilitates parallel work and interactivity between the different people involved in a project, providing them with the communication infrastructure needed for optimized exchange. Not least interest is the services the intranet offers: e-mail, file sharing, electronic forums, Internet browsing tools.

Electronic Document Management involves defining management rules and methods established prior to the implementation of the systems (Gordon & Miller, 2016; Allen, 2016).

The general structure of an IT management system

In order to define the general structure of a computer system, it is necessary to depart from its function of processing the available data in order to obtain the necessary information for the decision making in the management process.

The three major components of the IT system are:

- Entries
- Processing
- Outputs

Entries represent the set of data uploaded, stored, and processed within the system to obtain the information.

Entries are classified into two groups, namely:

1. External transactions reflecting the dynamics of economic and financial operations and processes within the firm. They come from the outside of the computer system. There are external transactions: data on raw material supply, data reflecting cash and payment operations and so on Internal transactions are represented by:

- Data recorded in primary documents at the place of production of the operations he / she highlights within the firm (eg a consumer bill, an invoice issued to a customer, etc.);
- Data coming from the economic-financial-banking environment, recorded in documents or written in norms and / or legal provisions (invoices received from suppliers, payment order honored by the customer, legal VAT rate, profit tax rates etc.) ;
- Data coming from other operating systems within the same company.
- Data from other IT systems outside the company.

The data recorded in the documents will be entered into the computer system in the following ways:

– Performing specialized computer system procedures allowing data uploaded by the operator based on data collection models generated on the computer monitor and data validation;

– Document scanning, state-of-the-art optical technology, allowing very large data collection over a short period of time.

Entries can be made directly using modern TI means such as:

– Data transfer via the local network within the company, a Novell network, for example, or the intranet, thus making the outputs of a company's IT subsystem into inputs for another subsystem;

– Remote Data Transfer:

– Through the Internet, including the use of Electronic Data Interchange (EDI) technology;

– Through private networks - MICR (Magnetic ink character recognition) documents are completed using stylized characters written with magnetic ink reading documents through specialized equipment:

- Magnetic tape cards
- Smart cards
- Bar codes
- Voice recognition
- Digital cameras
- Touch screens.

Internal transactions are the result of automated processing within the IT system leading to structural changes in data collections. Examples: total value of delivered products, total amount of receipts, etc.

The processes, the second defining element of the computer system, represent a homogeneous assembly of automatic procedures, realizing:

- Initial creation and updating of the database
- Exploiting the database
- Reorganize the database
- Saving / restoring the database.

Outputs of the information system are represented by the results of the processing carried out. These outputs, depending on the nature of the processing that generated them, are of two categories:

- Outputs resulting from data transfer operations that have not changed their value since the time they were placed in the system. For example: the number and date of an invoice, the name of a product, the quantity invoiced, etc.
- Outputs obtained from some calculation operations based on predefined algorithms (invoice value, total invoice, sales value per month ... etc). Outputs of the IT system may be classified according to their content and form of presentation in:
- Synthetic indicators found in on-board dashboards that can be consulted on-line;
- Reports (situations) that group various synthetic or analytical indicators in tabular form. Example: Paying State, Stock Status of Finished Products and Synthetic Balance.

Either two files organized sequentially, with data on taxes due to the state on the radius the second financial administration. The articles have the structure:

ID_ contributor char[13]
Name_and_surname char[30]
Address char[50]

Annual tax on buildings and land, calculated float

– Annual tax on buildings and land, paid float

– Considering the files sorted by the amount of the calculated tax, write one program for entering data.

The following application program will manage the calculated tax:

```
#include <stdio.h>
#include <conio.h>
#include<process.h>
#include<stdlib.h>

struct contributor {
 char id[13];
 char name[30];
 char adress[50];
 float ic,ip;
};

void main()
{
      FILE *f;
      contributor x;
      char name_f[20];

      printf("\nName of file: ");
      gets(name_f);
      fopen_s(&f,name_f,"wb");
      if(!f)
      printf("\nFile %s can't be open",name_f);
      else
      { fseek(f,0,SEEK_END);
        printf("\nID (sau CTRL_Z): ");
        fflush(stdin);
        gets(x.id);
        while(!feof(stdin))
        { printf("\Name and surname: ");
          fflush(stdin);
          gets(x.name);
            printf("\Adress: ");
          fflush(stdin);
          gets(x.adresa);
            printf("Calculated TAX: ");
            scanf("%f",&x.ic);
            printf("Paid TAX: ");
            scanf("%f",&x.ip);

            fwrite(&x,sizeof(contributor),1,f);
```

```
          printf("\nID (or CTRL_Z): ");
          fflush(stdin);
          gets(x.cnp);
        }
        fclose(f);
       }
  printf("\n End of program!");

  printf("\n");
  getch();
}
```

For the file generated in the previous program write a program that generates in a text file a list of taxpayers (taxpayer) with the highest unpaid debt.

```
#include <stdio.h>
#include <conio.h>
#include<process.h>
#include<stdlib.h>

struct contributor {
 char id[13];
 char nume[30];
 char adresa[50];
 float ic,ip;
};

void main()
{
      FILE *f,*g,*h;
      contributor x;
      float max;
      char name_f[20];
      int poz;

      printf("\nName of file: ");
      gets(name_f);
      fopen_s(&f,name_f,"rb");
      if(!f)
            printf("\nFile %s can't be open",name_f);
      else
      {
            fopen_s(&g,"temporar.dat","wb");
```

```
            fread(&x,sizeof(contributor),1,f);
            max=0;
            while(!feof(f))
            { if(max<(x.ic-x.ip))
              { max=x.ic-x.ip;
                poz=ftell(f)/sizeof(contributor)-1;
                fclose(g);
                fopen_s(&g,"temporar.dat","wb");
                fwrite(&poz,sizeof(int),1,g);
              }
              else
               if(max=(x.ic-x.ip))
               { poz=ftell(f)/sizeof(contributor)-1;
                 fwrite(&poz,sizeof(int),1,g);
               }
              fread(&x,sizeof(contributor),1,f);
            }

       rewind(g);
       fopen_s(&h,"List_contr.txt","w");
        fprintf(h," The list with the highest unpaid debts:
\n\n");
       fprintf(h,"\nMaximum debt este %10.2 Euro", max);
       fprintf(h," unpaid by the following taxpayers: \n");

       fread(&poz,sizeof(int),1,g);
       while(!feof(g))
       { fseek(f,poz*sizeof(contributor),SEEK_SET);
         fread(&x,sizeof(contributor),1,f);
         fprintf(h,"\n%13s %30s %50s",x.id,x.name,x.adress);
         fread(&poz,sizeof(int),1,g);
       }
       fclose(g);
       fclose(h);
       printf("\nList is in file List_contr.txt");
       remove("temporar.dat");
       fclose(f);
      }

  printf("\n End of program!");

  printf("\n");
  getch();
}
```

The management information system assures and provides the information requested by the user, using the IT tools, to substantiate the decisions regarding a certain area within the firm.

Current IT systems are integrated systems. They are characterized by the application of the principle of the unique data entry and multiple processing in accordance with the specific information needs of each user. Improve data organization in external memory by implementing a better performance model. It aims to increase the logical and physical independence (up to the total), to provide the most efficient and automated data description languages, to provide powerful data manipulation languages, to provide non-procedural retrieval languages, reduction and control of redundancy (Gordon & Miller, 2016; Alter, 2016).

4. Conclusions

The overall objective of a program is to provide complete software support for the development of computer applications with databases. Being a specialized environment, the software meets the user's information requirements in an optimal way. Thus, it minimizes the cost of data processing, reduces response time, provides flexibility and openness to the application, ensures high data protection. (O' Brien & Marakas, 2016; Gordon & Mileer, 2016). A system is a set of interdependent elements and components between which a dynamic interaction is established based on predetermined rules in order to achieve a certain objective.The dynamic interaction between elements materializes in the flows established between them, flows involving the existing resources (O' Brien & Marakas, 2016; Alter, 2016). The multitude of organizational components and the interaction between them aim at achieving a certain global goal that is that an operating the company in optimum conditions or achieving goals. The software programs improves automatization and optimiuzation of all processes existing in every organization. The IT systems provide the optimal solutions for the strategic management by processing existing data and agregating for the important economic indicators.

References

Allen, T. (2016). *Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information Within the R&D Organization*. Cambridge, MA: MIT Press Books.

Alter, S. (2016). Defining Information Systems as Work Systems: Implications for the IS Field, *Business Analytics And Information Systems.* Available at https://repository.usfca.edu/at/22.

Coleman, K., Pigman, D. & Pulak D. (2015). *Reengineering MIS: Aligning Information Technology and Business Operations.* PA, USA: IGI Publishing Hershey.

Gordon, L. & Miller, D. (2016). *A contingency framework for the design of accounting information systems.* Pergarnon Press.

O' Brien, J. & Marakas, G. (2017). *Management Information System*. Mc-Graw Hills.

Swanson, E. & Ramiller N. (2015). The Organizing Vision in Information Systems Innovation, *The Institute for Operations Research and the Management Sciences.* Linthicum, Maryland, USA.