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The Annals of "Dunarea de Jos" University of Galati
Fascicle I – 2009. Economics and Applied Informatics. Years XV - ISSN 1584-0409

New Valences for the Financial-Accounting System

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Abstract. A new approach to a company's information systems is needed, if we take into consideration the globalization process of the economy, the intensified competition, the impose of new qualitative demands or the adjustment to new accounting standards. The former accountant is about to be replaced by the „professional employee with accounting information", who knows very well how to use the domain technologies. The need for clear, correct and significant information has become a must for all the departments of a company and, definitely, this is especially the case for the financial-accounting department, i.e. when we have to come up with solutions for the profitability of the company.

Keywords: financial accounting system, intelligent technology, multiagent systems, mining technology.

JEL Code: G0, L86

1. Introduction

Information technology has constantly changed over the past few years, and this is precisely due to its demands: the necessity to make un intellectual „upgrade" in order for us to stay competitive within society. Its effects are both positive and negative, but we have to clearly understand how an organization is formed and structured so that we can eventually identify the impact of new technologies.

Access to information is a key-demand for every company that intends to be competitive on the market, without neglecting the rapid changes that take place nowadays. Every manager wants correct real-time information, in a proper format and at an accessible price. As a consequence of the developing of new technologies in the field of information, information systems have lately evolved and succeeded in meeting the demands of the managers.

These systems have managed to offer qualitative information as well as new means of its interpreting, so that the decision process has become better. Nevertheless, we can see that the demands of the managers become more and more complex, while taking decisions implies analyzing and using more and more items of information, in ever more different formats. Thus, we consider that this complexity can be approached by using new technology-based information systems, and should these systems also be intelligent, success is all the more guaranteed.

2. Information system in a modern company

Generally speaking, information system can be defined as a sum of human resources and capital, which are invested in an economic unit in order to collect and process the necessary data for the producing of information that will be used at all decision levels of the company.

The modern company and its accounting information system are considered important domains which are analyzed in specialized literature given the fact that there are two opposite ways of action, i.e.:

- the need of the company to join the trend of information globalization;
- the restrictive conditions imposed by the accounting science and the accounting practice in the field.

Generally speaking, an accounting system works with data from all the activities of a company, activities for which the managers have corresponding numeric items of information that are certified by justifiable documents and expressed in money standards. All these shall be useful for planning, controlling and presenting the financial balance and the results of the activities of any company [Feleagă, Ionaşcu, 1998, p.62].

As a consequence of new market tendencies, nowadays, the need for communication and knowledge is more and more obvious within almost every organization, irrespective of the field of activity to be researched. Thus, communication and knowledge exchange are realized by means of a fundamental element: information. Information is an abstract term, a result of the process of intelligent knowledge, yet at the same time an ubiquitous reality. It dominates and explains the universe, certainly, as much as the process of knowledge makes it possible. In the field of economics, information is used at all levels: for the most insignificant activity (i.e. a mere transaction)or even for mega structures such as: joint venture, multinational companies, national or international economy. The transformations concerning the size and the structure of the parts that constitute the patrimony are expressed in a specific numeric language by the accounting.

The objective of the developing and bettering of a financial accounting information system by means of modern information technology is to increase the efficiency of every specific activity within a corporation.

Referring to the same aspect, the data concept can be considered as a measurable instrument for other actions, processes or phenomena. Data have a double function, if we refer to an information system:

- *object of processing* – data processing in an information system is a value-creating process that includes calling up and memorizing data, their processing and reorganization through different operations, the processing, analyzing and evaluation of their informational content as well as the presentation of the data in such a way as to fulfill the information necessities of the user. The data stored in the information system from external sources have to be representative, real, complete and up to date;
- *represents the main resource for the information system*.

As far as the information is concerned, it is meant to change the receiver's perception and it has an impact upon his or her judging and behaviour. Researchers have studied and described it as a message, be it under a document, audio or video format [Andone, Tabără, 2006, p.34].

Knowledge is a sum of items of information acquired in time and it represents the highest level of the processing of data, respectively, of information. Many specialists in this field refer to a pyramidal construction. Data are placed at the basic level, information is placed at the middle level and knowledge or intelligence is placed at the top level [Munteanu, 2001, p.14].

The complexity of each system depends also on the avalanche of new information technologies the management confronts with, and, consequently, the quality of the informatization results is influenced by the technology that is used. Usually, we are eager to keep up with new technology, yet this is not always possible. The financial status of the organization as well as the reticence about change of the employees responsible in this field may often lead to failure. This reticence is also caused by the employees` fear and reluctance to what is new.

The financial accounting system mainly aims at dealing with information referring to:
- monitoring financial accounting operations;
- adopting and respecting rules and standards;
- sales and supply volume;
- payments, returns or relations with business partners.

It follows the making up of informational reports (according to the generally accepted accounting principles) for different categories of interested users. The sum of items of information specific for managerial accounting are meant to generate internal reports relevant for the management, for the leading activities, for the drawing up and fulfillment of plans and strategies, etc. Thus, all reports are made out according to the accounting methods chosen by the management of the organization, irrespective of them being accepted or not. This attention paid to management and, especially, to planning is linked to future and to its challenges.

At the same time, the informational system targets meeting the informational demands necessary for the managers decision-making process. Therefore, it can be considered as a management tool for achieving the objectives of financial accounting activities.

Many recent technological changes have continuously modified the our vision upon an organization and its activities. The important changes that have influenced businesses, structures and behaviours have also modified interpersonal relations. From an organizational point of view, intelligent systems have become one of the most challenging aspects of informational technology: this is due both to its practical implications in the activity of an organization, and to its influence on education. These systems offer real tools for simultaneous increase in quality, productivity and innovation in all fields of an organization [Andone et al., 2001, p.45].

Every time some new informational technology appears, it should be rapidly adopted in order to make the most of all its advantages, thus bettering the activities of the organization. If a company is indifferent to these new trends in technology, it risks loosing ground to those who have adopted and understood the benefits of new informational technologies. In addition, the developing of performing information systems (based on modern informational technologies) should come to the attention of the accountants, especially nowadays when we are confronted with so many methodologies, techniques, tools and standards that cumulate and share information from various domains, as it is the case with financial accounting field.

2. Expert systems

Expert systems are program systems based upon artificial intelligence techniques that store the items of information of experts in a certain field and then use them (or even multiply them) in order to solve specific problems. Artificial intelligence tries to imitate human reasoning in an adequate information environment. Then, by means of implementing some artificial judgments, it tries to help solving problems in a specific domain. Expert systems were the most widely spread intelligent informational systems at a certain moment. They reached a peak around the 80's.

Expert systems store the pieces of information from experts and then, by means of artificial intelligence techniques, multiply and explain them, thus facilitating the decision-making process on certain management levels (especially, on the operational management level).

The main characteristics of an expert system are:
- it processes symbolic or numeric data;
- it multiplies and explains the experience of human experts;
- it offers very relevant results;
- it is relatively easy to define and use;
- it offers explanations for the results obtained at a certain expertise level;
- the introduced data are independent from the reasoning.

It is very important the way in which the expert system uses the stored pieces of information, because such a system should be equipped with both relevant knowledge and means of using it in order for it to be considered qualified in a certain field [Andone et al., 2001, p.65].

In a corporation, there are several activities for which the use of an expert system would mean a significant improvement. The most important activities are:
- decision-making concerning financing an investment;
- financial analysis and planning;
- treasury handling.

In conclusion, the solutions to some complex problems found by expert systems are qualitatively better because they offer the possibility to automatically use within the reasoning some heuristic rules validated in practice.

3. OLAP technology

The fact that there has been recognized the existence of two completely different types of information systems is probably the most important concept linked to the theoretical fundament of using data storage:
- systems that use operational data (OLTP – *On–Line Transaction Processing*) – organizations have a variety of operational systems, such as financial, supply chain or payment systems;
- systems that use informational data, such as the systems based upon OLAP (*On–Line Analytical Processing*).

The simple conceiving of the data storage does not guarantee the expected benefits for the organization. In order to complete the chain, from transactional systems to decision support systems, informational technology has to provide techniques that shall allow the use (for analysis and decision making) of the pieces of information stored in data storages. These systems called *OLAP* are often taken for *Decision Support Systems* or *Management Information System*s, but in fact they are only a component of these systems [Georgescu, Georgescu, 2005, p.196]. Thus, *table 1* shows a comparative analysis of information systems for transactions, of those for management (MIS), of decision support systems (DSS) and of expert systems.

OLAP processes are used by decision-making factors in order to extract information from structured and multi-dimensional data and to analyze them using sufficiently quick tools which allow their sharing between more users [Pendse, 2005]. The analytical on-line data processing tools refer to a category of software tools that give non-specialist users easy, interactive, consistent and flexible access to the pieces of financial accounting information stored in a data storage. This fact allows the non-specialist users (analysts of the processes of a company or its

managers) to consider data from several different points of view so that the final results reflect the real activities of the organization, exactly the way they are perceived by decision-making factors[1].

Table 1. Comparative analysis between OLTP, MIS, DSS and expert systems

Characteristics	OLTP	MIS	DSS	Expert systems
Application type	Handling of stocks, payments, deliveries, orders	Production control, budget analysis, short-term forecasts	Credit evaluation, quality keeping planning, project planning	Analyzing, prospecting, limited domains
Objective	Automatic processing of data transactions	Information	Guiding in decisional process, decision implementation	Replaces human factor
Typical operations	Updating	Reporting	Analysis (for example, multi-dimensional analysis)	Finding data
Possible decisions	None or simple decision models	Support for solving structured problems	Support for semi structured problems	System makes complex unstructured decisions and uses rules (heuristic)
Data sources	Internal	Internal	Internal, external	Internal, external
Management level	Operational	Tactical	Strategic	Strategic
Major task	Efficiency of the operational data process	Decision process efficiency	Decision process efficacy	Effectiveness, the transfer of knowledge about an activity
User type	Operators	Managers	Managers	Specialists and managers
Stress on	Integrity and data consistency	Periodic reports, on purpose and in special cases	Flexibility, support for on purpose demands and analyses	Advice and explanations, solutions and new strategies

OLAP quality is proven by the data volume it can actually handle at a certain moment and not by the data volume it can be memorized in general. An OLTP application is evaluated depending on its capacity to safely deal with consistent data, whereas OLAP systems are evaluated depending on their capacity to create information out of data. In addition, the latter have to allow complex operations for allocation calculation (which uses hierarchies in a descending way), for the analysis of the trend through the variation of medium values, for percentage variation, for historical stock data - used to predict future events or for aggregated data – used to estimate the initial data [Thomsen, 2007, p.39].

OLAP tools are important for the management of an organization, because they can extract pieces of information from all the data storages, but also from other sources, at the same time offering o global view over the company's situation (by means of multi-dimensional analysis).

4. CASE tools

CASE tools (*Computer Aided Software Engineering*) are information applications, made out of more components, that help to the accomplishment of a software project at certain (or at all) levels of the lifespan of an application.

[1] *http://www.olapreport.com/fasmi.htm, 10.08.2006.*

The main objective of CASE tools consists of putting into practice the program-projecting products and the making up of the software by means of the computer. These tools can be used from the stage of establishing the requests to the stage of the maintenance of the informatics product.

The use of these tools was in a way also determined by the disparity between hardware and software towards the end of the 60`s (the hardware being ahead of the software at that moment). The software component had somehow fallen behind, which reflected in a few problems concerning the developing of applications[1]:

- very high costs for developing;
- low quality and reliability;
- unsatisfying performance – reaction times were very big;
- quite old or event inexistent interfaces with the user.

Depending on the point of view from which they are looked at, *CASE* tools can be ranked according to several criteria.

- from the point of view of the used methods:
  a. *object orientation*– offers guidance for object-oriented methods/methodologies;
  b. *non object orientation* – offers guidance for structured/systemic methods;
  c. *hybrid* – combines object-oriented methods with others.
- from the point of view of the domains and the number of different stages:
  a. *horizontal* – offers guidance in many domains or in many stages;
  b. *vertical* – offers guidance only in a certain domain or only in a certain stage. Depending on the number of different stages, CASE tools can be:
     i. CASE tools that offer guidance during the whole lifespan of an information system;
     ii. CASE tools that offer guidance only at certain stages of the lifespan of an information system.
- from the point of view of the stages in which we can make use of them:
  a. *Upper CASE* – offers guidance during the first stages of the lifespan of an information system;
  b. *Lower CASE* – offers guidance during the last stages of the lifespan of an information system;
  The components of a CASE tool are shortly presented in the following lines.

1. *Data storage* are the product of economic environment and advanced technologies. On the one hand, the economic area becomes more and more competitive, global and complex and it asks for ever elaborate pieces of information so that it can support strategic decisions. On the other hand, the evolution of informational technologies offer efficient solutions to deal with a huge volume of integrated data, ensuring proper levels of synthesizing/going into proper details. Data storages are an important tool for executive directing due to their systematic organization, their understanding and using of these data into taking strategic decision.

Data storage is the very core and it contributes to the integration of the components of a CASE tool. (on a data and information level). Analyzed from this point of view, the data storage consists of:

- information storage;
- data dictionary.

[1] *http://www.ispras.ru/groups/case/background.html, 11.10.2007.*

The data storage includes all the pieces of information gathered during the project in order for them to be used again. That is by offering new information on the basis of the information already provided and the adding of the latter in the data storage, too. In fact, the data storage of a CASE tool functions according to the principle of an expert system, whose data storage permanently enriches by inferring new data on the basis of the already existing and of those external ones[1];

2. *The diagram editors* favor the generating of the diagrams implemented by the methodology/method specific to the CASE tool. At this level, interaction with the user takes place and that is why they have to be easy to use and they should offer support for the automatic reflection of the changes made in a diagram into the other objects linked to them. One of the most important characteristics of a CASE tool is its capacity to do *reverse–engineering*, that is to allow generating diagrams and specific models - following the analysis of the code of an application, but also to allow their updating as a consequence of the code changing[2];

3. *Structure analyzers* check the coherence of the data stored in the data storage in order to identify the possible reversed or ambiguous specifications (for example, in order to identify classes with the same name in a class diagram);

4. *Project management tools* are components that help controlling the project and planning its stages;

5. *Transformation tools* help automatically transferring from one model/diagram to another (for example, the automatic transferring from the conceptual data model to the logic data within the entity-association formalism;

6. *Fill in form and report generators* are used to generate interfaces for the users so as to interactively communicate with them concerning fill in forms, menus, etc. and data presentation in the form of reports;

7. *Documentation generators* are components that allow the automatic generating of a project documentation for each stage;

8. *Code generators* generate a source code on the basis of the diagrams and the pieces of information from the data storage. As far as the object-oriented CASE tools[3] are concerned, a code is generated only for class descriptions, method specifications and class inheritance relations and not for the code referring to methods. In order to generate a code for method code it is necessary to have detailed descriptions and very complex diagrams which often might prove to be much more difficult to get than the mere writing of the code by the programmer;

9. *Reverse–engineering components* allow shifting from a stage to a previous one. In other words, by analyzing the program code, specific project elements (diagrams, models) can be obtained, elements which will automatically reflect in the data storage. Moreover, any changing operated on the code has to be reflected in diagrams and models[4];
10. *Specialized browser* is a component which allows the visualization of the specific data of a project;

11. *Test tools* are components that comprise specific elements for testing an application.

[1] *http://www.developerdotstar.com/mag/articles/oo_case.html, 12.01.2008.*
[2] *http://www.sei.cmu.edu/legacy/case/case_whatis.html, 11.10.2007.*
[3] *http://www.matrice.co.uk/training/four_siders/H–OwCASE_4s.html, 12.10.2007.*
[4] *http://trese.cs.utwente.nl/automatingOOSD/papers/Greefhorst.pdf, 12.02.2008.*

5. Usage of data mining technology

The increase of database dimensions, the developing of new applications in domains such as financial accounting, commercial, industrial or administrative have led to the users' growing interest in automatically extracting information. Thus, finding and extracting data from the financial accounting databases is a challenging domain worth being investigated.

The key-elements that make us consider data mining tools a separate form of software are [Mohammadian, 2004]:

- automatic analysis – the role of technology is to automate the process of old data detailed analysis in order to find new data. This is in fact the most important difference from expert systems, where the model is created on the basis of the cumulative experience of an expert;
- big or complex data sets – allows the analysis of big financial accounting data volumes in a reasonable amount of time.

The techniques of data finding and mining can automate the process of calling up predictable data in the case of very big financial-accounting databases. Thus, answers to questions that usually entangled vast analyses are more rapidly found from the stored data. An example of predictable problem is identifying the financial situation of a company. Data mining technology can make use of the indicator values of the latest years in order to identify if a company is or is not in a good financial situation. Therefore, data mining technology can lie at the base of making a decision concerning a certain investment of an investor.

6. Usage of intelligent systems in accounting

The developing of intelligent systems in accounting is a difficult and long-term process, yet its results can be extremely useful. The technology of intelligent systems , as well as other technologies, is analyzed by an organization and then accepted mainly due to the benefits it can offer. Besides direct advantages (such as cost minimizing or productivity growth), intelligent systems have other indirect advantages, less obvious. Usually, those who use these systems have important advantages over their competitors. For these reasons, a chain-reaction has been identified in many domains of different organizations: as soos as one company has successfully implemented an intelligent system, its competitors immediately start using the same solution.

It is the same situation with the accounting domain: the most important accounting companies use new technologies to obtain a better positioning on the market or to consolidate the current one. Nowadays, these companies have developed and implemented several systems for dealing with their financial-accounting activities so that they can obtain better results and improve their own activity.

Moreover, we cannot neglect the commercial potential of intelligent systems: once a system is completed, it can be sold to other companies. This opportunity has been less exploited in the field of accounting due to several reasons[1]:

- experts who contribute to the system developing process are not willing to share their knowledge and experience with others, preferring to be the only „players on the market";
- creating an intelligent system (such as multiagent system) takes time and is very expensive; consequently, only big accounting companies have the necessary resources for it. Nevertheless, these companies have no interest in selling their systems, preferring to use them only for their own activities, thus keeping their competitive advantages.

[1] *http://www.cbr.cam.ac.uk/pdf/wp274.pdf, 10.02.2008.*

These things being considered, we state that large scale use of intelligent systems in the accounting field can create new perspectives for the accountant profession and it can minimize subjectivism by normalizing decisions.

7. Conclusions

Information technologies have developed due to modern science and they represent a means to disseminate scientific knowledge. They perpetuate order and „scientific" explanations specific to the present period.

Traditional information technologies are useful, but they limit the flexibility and the complete valorification of financial-accounting technologies. Thus, they can limit the actions of the decision making persons. Nowadays, it is necessary to immediately find the needs, to rapidly obtain syntheses and analyses, to prepare decisions and to have additional instruments and systems that can facilitate the process.

There are many situations when users of the financial-accounting data confront with complex unstructured and undefined problems that sometimes seem to be impossible to solve by the use of traditional information systems. In this case, the solution we propose is to make use of the opportunities of artificial intelligence and its subsequent technologies. That is why we can state that intelligent systems in accounting are a must and an opportunity because of the advantages and benefits they can generate.

At the same time, intelligent systems can be extremely useful when it comes to making the best decisions, because they extend the abilities of a decision actor, helping him or her better understand and control the activities in the financial-accounting domain. Thus, all the data can be used so as to solve complex problems.

We cannot neglect the benefits and the implications of other technologies (which are not considered intelligent). The latter are useful and they can better the flow of the already undertaken activities of the company. Yet, we believe that the future belongs to intelligent technologies, capable of reacting in the advantage of the user (at any level).

These things being considered, the projecting and implementation of a multiagent system within the accounting field is very useful, especially because of its fundamental characteristics (autonomy, reaction, communication). It can meet the necessities of a company by efficiently using financial-accounting data. Moreover, a multiagent system can improve the quality of the decisions taken by the management team, since it offers synthetic information of better quality and more rapidly obtained.

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