Considerations on Accounting Intelligent Systems Importance

Florin APARASCHIVEI
Facultatea de Economie şi Administrarea Afacerilor
Universitatea "Al. I. Cuza" Iaşi

Managers begin to realize the importance of artificial intelligence technologies for their organizations. Knowledge is today seen as the main organizational resource and that is what intelligent systems are about: manipulating knowledge. In this paper we highlight the main reasons that an accountant can bring to his managers to emphasize this idea: intelligent systems are really needful in modern accounting.
***Keywords*:** *accounting, intelligent system, knowledge, decision, competition, learning*

Introduction

Accounting is an area that has generated a real effervescence in organization's informatization. From accounting data collecting, information systems gradually evolved to information processing, office automation, decision support and knowledge storing and distribution. In this evolution, intelligent systems initially turned up to be a solution to problems otherwise untouchable with conventional technologies. Knowledge management systems strengthen their position and importance, while with business intelligence they are the state of the art.

Accounting intelligent systems are all around us, so it's imperative to know their advantages and use them in our organization.

A Historical Perspective

Although development of accounting expert systems started in the early 1970s, published research on this topic only started to appear in 1977: TAXMAN in the tax domain and TICOM in the financial reporting domain (Liebowitz, 1997). These were followed by others research prototypes developed in the financial reporting/auditing, tax and managerial accounting domains, many being founded by the large accounting firms and forming the foundation upon which some of the later applications were built.

On the mid-1980s, the major accounting firms began to publish articles about their development efforts. Their primary motivation for developing commercial systems has been to automate processes that nonartificial intelligence techniques have not been able to automate. This desire for automation was based on reasons like higher quality, more consistent performance and more efficiency.

From the beginning the specialists saw that this new technology will bring a wave of changes in the accounting area and tried to identify its main benefits, as well as its threats (Schwartz, 1989). Efficiency increase, distribution of expertise and education and training possibilities were seen as the main advantages for the new technology. As the field began to consolidate and the number of commercial system grew (Brown, 1994), accounting intelligent systems evolved from a spoilt firms toy to a necessity (Yang & Vasarhelyi, 1996). Also, the notice of expert systems disadvantages moved the interest to other artificial intelligence techniques, like fuzzy systems, neural networks and genetic algorithms, to overcome it (Brooks, 1994).

Accounting Intelligent Systems Advantages

Managing a business today primarily means making the right decisions at the right time. In a highly competitive environment, it survives that company that makes better decisions and works more efficiently, and not necessarily that who makes better products or services.

A company's manager, in order to make decisions or business choices, wants to have all the available information about the decision problem on the table. Nevertheless, statistics and researchers' studies shows that managers often receive either incomplete or incorrect information, or right information, but arrived with delay and therefore useless. In fact, specialists say that it is virtually impossible to simultaneously achieve a maximum level for all the qualities of information (Gelinas & Sutton, 2002). It seems quite strange this situation, after decades in which we created accounting and business information systems and in a period when we discuss about Internet, Intranet, e-mail, search engine, weblog or ERP.

Experts use the word *information overload* when they speak about this wave of information from an increasing number of new sources (databases, web, e-mail, weblog, faxes or voice mails), so it's virtually impossible to timely distinguish between valuable and irrelevant information. The manager is overwhelmed and its ability to take the right decisions in a helpful period fails.

The scientists at the Berkley University estimated that all the information mankind ever produced, beginning when man first painted on cave walls and wrote on papyrus to 2001 best-sellers, comes to approximately 18 exabytes (18×10^{18} bytes). But what's really scary is that 12% of it was generated in 1999 alone, and two-thirds of that, or 1.5 exabytes, are digital. Three years later, in 2002, mankind created 5 exabytes of new information, 92% of which was stored digitally on magnetic media, mostly in hard disks[1]. On the other hand, statistics show that the average man can only read about 300 kilobytes of text per hour without analyzing it.

To analyze information and locate the real useful things, manager needs not only to dig in this mountain of information (data mining tools), but to be able to extract the substance, find patterns and types of behavior, find possible errors or atypical variations, or just give explanations and suggest solutions. Recently managers desire computer tools that are capable to make predictions or elaborate scripts based on company's historical data. Today, all this aspects of *decisions automation* can be solved with specialized intelligent systems.

Accounting is also facing such an information overload. Domains like audit and internal control, where the volume and complexity of information that must be checked and looked after are huge, managerial accounting, where the amount of information grows at the same time with the business itself or the tax legislation usage, which in some countries is very complicated, justify development and utilization of accounting intelligent systems that support manager.

Once the concept of knowledge management arose, the organizations became aware of the role the human capital and the knowledge it owns can play for their business. So they showed their interest for capturing, storing, retrieving and distributing the knowledge of the individuals in the organization, regardless the appearance it presents (experts with many years of studies and experience, manuals, casebooks, practices, rules, regulations). Intelligent systems and, especially, expert systems can offer the needed tools for *expertise storing* in a knowledge base for future usage, as a stage to a knowledge management system.

Accounting is an easy task – say all the unspecialists. Today, any person that owns a personal computer and accounting software can record all the transactions of the company and elaborate the accounting and financial reports legally needed. But in fact this means recording and not accounting. There are many domains of a company's accounting that require a high degree of expertise and professional judgment to correctly evaluate all the facts and to solve the problems in a better way. An accounting specialist is hardly trained, after many years of study and practice. Domain experts are

[1] http://www2.sims.berkeley.edu/research/projects/how-much-info-2003, 31.01.2007

rare, expensive and hard to find, but letting the responsibilities on the beginners shoulders can be lethal. Storing these experts knowledge in an intelligent system knowledge base that will not get ill, will not retire, will not request salary rise and will not leave to a competitor, may seemed the adequate solution for these human expertise inconvenience.

Even more, an intelligent system will be a reliable assistant for the accountant at his work, helping him to solve some of the problems or even allowing commissioning some of the tasks to his younger or less experienced assistants. This way, the intelligent system can contribute at teaching and *learning* new experts, especially that some of them have a reasoning explanation module. The intelligent system will save up the expert's time, banishing many of the repetitive and time-consuming tasks.

The expert systems have a specialized explanation module, which role is to provide to users both the knowledge the system contain and the reasoning processes they go through or the solution to a particular problem. Most explanation facilities in expert systems provide simple traces or lines of reasoning, the path followed by the system to reach its conclusion. In this way the system justifies *How* he got to a solution and *Why* certain decision were made.

The process of developing an intelligent system in accounting is long and difficult, but very useful. Thus, in the knowledge acquisition stage the expert faces the challenge of explain himself and to others the rational path of his judgments, and in this way can be found and solve some possible problems. Plus, from the possible ideas clashes that appear when are many experts involved can arise new ideas and solutions.

Intelligent system technology, as all the others new technologies, was evaluated by the companies and embraced (or not) first of all for its potential benefits. Besides direct advantages, like cost cut or productivity growth, intelligent systems bring more indirect advantages, less quantified, and those who use them have important *competitive advantages* in the struggle with their market opponents. That's the reason why many companies that have developed such intelligent systems kept a rigorous silence about their researches and achievements.

For these reasons, in many areas appeared a chain reaction from the companies: once one of them successfully implemented an intelligent system, its competitors hurried to make the same. Accounting recorded the same evolution: the most important accounting firms (the big five at that moment) embraced the new technology, as an attempt to win a better position on the market or just to consolidate the actual one. Actually these firms developed and implemented not one, but many accounting intelligent systems, hoping to easy up their job and achieve better results.

We can't neglect the *commercal potential* of intelligent systems: once such a system is finished, it can be sold to other companies. This opportunity was less exploited in accounting area, for some of the following reasons (Nordlander, 2001):

- The experts that contributed to system's development process were not willing to share their knowledge and experience with others, prefering to be the only players on the market;
- The development of an intelligent system is a long and costly process and, as a consequence, only the big accounting firms had the necesary resources. But these firms had absolutlly no interest to sell their resulting systems, because they rather preferred to use themselves, internally, thus preserving the competitive advantages;
- The usage of intelligent systems in accounting involves some legal aspects regarding the fact that a discontented client could turn against the computer program developer for compensations to the errors that appeared on the expertise results or the audit report;
- It's not yet very clearly who is the owner of the expertise stored in the system's knowledge base: the developer or the

experts that have contributed to it. Because of that, selling an intelligent system could bring some problems regarding the intellectual property rights.

These are the reasons for what there are not so many commercial accounting intelligent systems. Interested companies can however benefit from others experience in this area by purchasing expert systems shells, meaning intelligent systems without the knowledge base, which will be populated by each customer itself.

Not for the last, we think that high scale usage of intelligent systems in accounting could bring a new view about the accounting profession, less subjective, through *decision normalization*. Accountant's conclusions are thus looked as a long succession of logic reasoning, after a structured analysis, done with scientific methods, and the same accounting problem will always have the same solution. Obviously some of the fairytales numbers magician image that an accountant currently has will vanish, but this could be a suitable evolution for accounting science

Many times, the accountant must face really complex problems, unstructured and undefined, which are impossible to solve with traditional optimization methods. In these circumstances, the only solution came from artificial intelligence field and its techniques.

Therefore, it is without denial the necessity and importance of intelligent systems in accounting, because of multiple advantages these new technology brings in the area. A graphical presentation of all the benefits we presented so far is shown in figure 1.

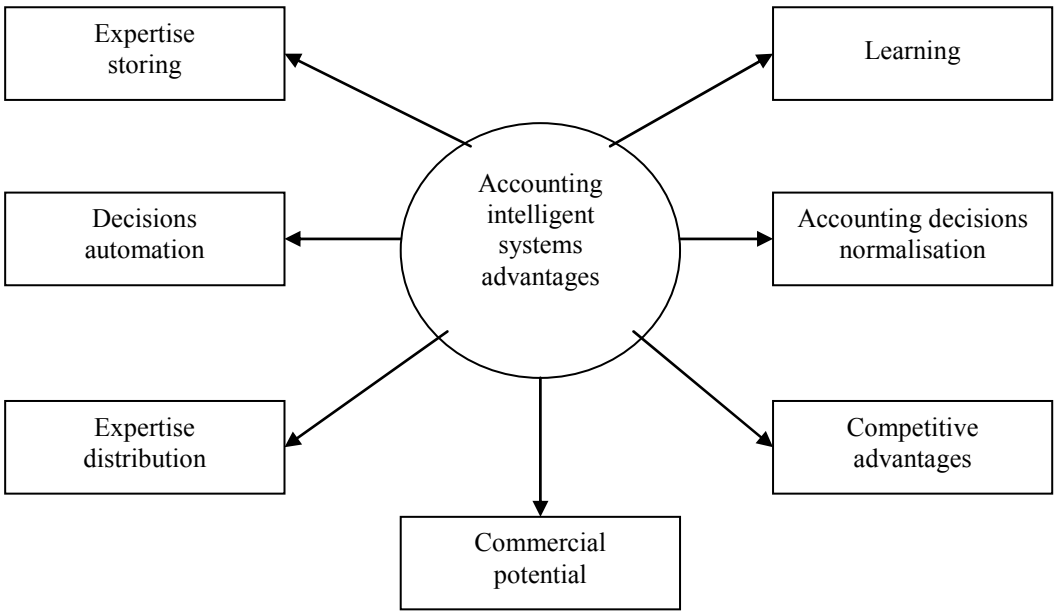

Fig.1. Accounting intelligent systems utilization advantages

Nevertheless, companies and researchers interest for accounting intelligent systems seems to decrease lately. Thus, the scientific magazines are not filled with articles on this area, the papers from international conferences treat other subjects and domain web pages are not updated for years. A possible explanation for this phenomenon is the fact that most of the accounting intelligent systems developed were expert systems. But this technology began to fade after 1990, because it was already a mature technology with little scientific interest, but primarily because its limits. The most important problem was that the expert system knowledge base, implemented at great pains, was very difficult to update and maintain, so the system's knowledge easily become obsolete. The knowledge that the expert system owned was easily outrun by the impetuous evolution of today's world.

Because of that, the intelligent system technology began to be used and integrated in complex conventional information systems, as an attempt to cover much of the organizations informational needs. This is how appeared complex business information systems attempting to integrate all the processes of the organization. In other cases, expert systems were integrated with another intelligent technology, resulting hybrid intelligent systems aimed to cumulate the strengths and overrule the weaknesses for each of them.

For example, by combining two known technologies, expert systems and decision support systems, the researchers brought a new technology, called *automated decision systems*, which embodies the best attributes of each parent. Rules based systems, like expert systems, these systems involve statistical and algorithmic analysis of data, like DSS, to make decisions in real-time (Davenport, 2004).

In fact, miscellaneous applications of artificial intelligence have today an important place in business world, often without the user's knowledge (many persons that frequently use search engines or Office Assistant in Microsoft Office packages have no idea that these technologies have their roots in artificial intelligence research). But mostly, intelligent technology is used for decision support modules of complex information systems.

In our opinion, any future study about accounting intelligent systems must take care of the following aspects:

- The manner in which the system will update its knowledge, to avoid premature age of its knowledge base. The best solution seems to be a neural network capable to bring his knowledge up to date;
- Integration of intelligent system into a more complex information system. Today nobody wants to buy separate applications, from different suppliers, to solve individual problems;
- The advantages that the new system will bring to the management. Company's manager must be convinced by the utility of the new system, because he will never consent to spend the money just for novelty of the technology.

Conclusions

It is no longer a question of whether or not the intelligent systems will be used in accounting, because they are already here. Accounting professionals who wish to stay abreast of current developments and remain competitive should know all about technology's great potential and advantages. In today's world, only those who embrace the right technology at the right time can face the new challenges and survive on a highly competitive global market.

References:

1. Andone, I., (2002), *Sisteme inteligente hibride*, Editura Economică, Bucureşti;
2. Andone, I., Tabără, N., (2006), *Contabilitate, tehnologie şi competitivitate*, Editura Academiei Române, Bucureşti;
3. Brooks, R., (1994), *Neural Networks: a New Technology*, CPA Journal, March;
4. Brown, C.E., (1994), *Accounting Expert Systems Applications*, http://www.accounting.rutgers.edu/raw/aies/www.bus.orst.edu/faculty/brownc/es_tutor/acc_es.htm;
5. Davenport, T., (2004), *Decision Evolution*, CIO Magazine, Oct. 1;
6. Gelinas, U., Sutton, S., (2002), *Accounting Information Systems*, 5th Edition, South Western;
7. Liebowitz ,J. , (1997), *The Handbook on Expert Systems*, CRC Press LLC;
8. Nordlander, T. E., (2001), *AI Surveying: Artificial Intelligence in Business*, MSc dissertation, De Montfort University;
9. Schwartz, H., (1989), *Expert Systems in Accounting*, CPA Journal, April;
10. Yang, D., Vasarhelyi, M., (1996), *The Application of Expert Systems in Accounting*, http://gsma62.rutgers.edu/raw/publisher/applica4.htm;
11. http://www2.sims.berkeley.edu/research/projects/how-much-info-2003.