THE IMPACT OF ARTIFICIAL INTELLIGENCE ON ACCOUNTING

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Abstract

Due to modes of communication, society is described by the rapid changes and innovation in all knowledge domains. In the new millennium, economy can be seen like a scene in which businesses have become e-business, commerce has become e-commerce, e-service, but at the same time new e-communities are born. In this paper they were approached in a view of a great actuality, the newest directions of accounting modernization through intelligent systems such as expert systems. The outgrowth of such a technological ensemble assumes going through a very complex research and development activity, which is impossible to handle individually or through the perspective of a single domain. That's why team work and multidisciplinary have formed the keywords of the entire approach. Out through are illustrated the notions of accounting, accounting profession, artificial intelligence, expert systems.

Key words: expert systems, financial reports, intelligent system

1. Introduction

The reality of the modern society shows that the development of the market economy and the increase of its complexity degree needs assuring an operative and complete economical information. Only this way, the economical information helps control the way of using the human and material resources, detect and examine the positive aspects and the existent shortages, in order to make the managerial decisions.

In this context, it may be stated that the accounting information is, presently, an indispensable element of the social progress. Leading the economical activities is a domain in which knowledge and informing make the essential attributes of any decisional act. The greatest part of the information used in the managerial processes are of accounting nature. Administrating and leading business cannot exist without this kind of information.

As an applicative social science, accounting is strongly influenced by the fiscal legislation. If, from the accounting point of view, the application of the IFRS made the international accounting convergence, from the fiscal point of view a common fiscal policy for all of the EU member country cannot be talked of. In an interview given to the Financial Times magazine, the European Commissar Laszlo Kovacs declared that the EU might introduce, from 2011, a common fiscal policy. This

ambitious fiscal project was presented by the European Commissar on Taxation and Borders Union to the Finances Ministers from the EU member countries. The project faces a series of critiques brought by the representatives of Great Britain and Ireland, which consider that a common fiscal policy will affect state sovereignty. The European Commissar on Internal Services Market, Charlie McCreevy, declared that there this project faces so many problems, that it is most likely for them not to be solved by 2011. Nevertheless, in 2009, the president of the European Fiscal Confederation, Stephen Colleclough declared that Europe heads towards an unitary fiscal policy. By his estimation, in the next period it is not a fiscal relaxation that will be seen, but a more clear strategy in regard to taxes and payments.

Accounting was and is depending on the economical development. That is why, as time passed, accounting was highly modernized in Europe, with the development of the old continent itself. Its appearance was conditioned by the existence of an accessible numerical system and a good development environment, with time this conditions becoming necessities, taking into consideration that nowadays, the problem of automating the processing circuit of the financial-accounting data is put, deriving from the idea of perfecting artificial intelligence [3].

Although accounting is a domain in which the artificial intelligence is present more and more, by the making of expert systems, there's a long way to go until an "artificial accountant expert" will be made, capable of making the decisions a contemporary accountant expert makes. Nevertheless, certain accounting operations were automated, in the commercial accountant programs.

2. Aspects on Artificial Intelligence

The artificial intelligence domain is interesting both from the point of view of the important practical applications, but especially because of changing the view on human activities. Ergo, we consider that the inventing of such extremely powerful and flexible programming environment, based on intelligent technologies, can transform the process of developing software, from a projecting and implementation process involving a relatively high number of programmers, into a quick prototyping process, followed by further refining, involving a decreased number of programmers that are qualified [9].

The artificial intelligence (AI) can be considered as being the informatics domain aiming to project systems endowed with certain properties usually corresponding to human intelligence: language comprehension, learning, reasoning, problem solving, theory proving etc [4].

As for accounting, in the narrowest way possible, it benefits in present of the theory principles of systems, cybernetics and informatics, to make integrated and expert systems of high performance, in the endless process of enriching and deepening the knowledge fields in accounting matters, due to the possibility of transferring intelligence from humans to the accounting-specific informational products.

3. The expert systems

"The expert systems are programs conceived to judge, in order to solve problems that usually call for human expertise. " [5]

Making an intelligent machinery to copy the complex performances of the human behavior makes a real challenge, due to the human's lack of capability to fully understand the processing mechanism, or the power of the human brain. The main characteristic of these systems derives from the knowledge base, with a search algorithm specific to the reasoning method. An expert system successfully treats problems for which a clear algorithmic solution does not exist.

Researchers and practitioners from the economical domain tried and managed to introduce ES to the accounting domain, leading to the increasing of these activities' complexity and of competition between specialized companies. In the developed countries, numerous companies and organizations developed the ES for a great variety of applications [7]. Presently, there are a lot of ES that can be acquired on the market, and the available ES generators ease the users in developing their own applications. Unlike most computing programs, requiring complete information in order to make decisions, the ES are programmed to find the optimum solution based on the available data, as a human expert would do [8].

An expert system is based on two distinctive and complementary components [6]:

a. programming technologies allowing the use of a great knowledge volume, as the way of differencing with them;

b. developed constructions and methodologies, allowing the effective use of these technologies.

In an ES, reasoning and knowledge must not be treated separately, because this type of system involves their harmonization.

Among the working instruments of the expert systems, the models in which a financial-accounting knowledge base can be screened, captioned and represented are taken into consideration. The main quality of computers is the capacity of making high computing speeds. Each programming language tries to make the computer more efficient from the computing power point of view, in making a program that judges, the starting point is the idea that the processing symbols can be numbers, symbols, accounts, texts or other concepts [10]. These are considered to be "physical symbols", which the computer can manipulate. A viable ES, doubled by the computer's working speed, can improve a certain working domain (the accounting domain) [1].

4. Study on using the ES in accounting

The objective of this case study is to analyze the differences between the decisions made by the human factor and the ones of an expert system having applicability in the economical-financial domain. For this, research was made on the real data afferent to a 3-year period (2006, 2007 and 2008) of the "Bookkeeper System" group, listed on the American exchange, at the NYSE. In order to get a real and well-consolidated comparison of the differences between the two decisional types, the alternative performance indicators EBITDA, EBIT and financial debt of the group were chosen as reference parameters. These indicators

are the most solicited by the financial analysts and investors, them being the stakeholders' category whose interests predominate on the financial markets (whose decisions in the financial reports made according to the IAS/IFRS or USGAAP come over satisfying the investors' interests, which can be seen in the accent put on the utility offered by the economical-financial information that exists in these reports).

The rules introduced within the used ES regard estimating the risk degree (very high, high, medium and insignificant), both inside and outside. The external risk factors are the company's most important in facing, them represented by the inflation level and the fiscal variables, which made true obstacles for the subsidies performing on financial markets (in countries) characterized by increased conditions of instability and turbulence.

Table no.1 The Indicators financial

Indicators	**2006 (th. $)**	**2007 (th.$)**	**2008 (th. $)**
Financial debt	35185	37172	39175
EBITDA	5670	5535	6335
EBIT	2680	2608	3554

The decisions made by management on group level, after recording these indicators and varying with the internal and external signaled risks, were 70% classified as being high and very high risks, mainly:

➔ in 2006, 5,530 shares were emitted at the nominal value of 62.9 $, fact that can be checked by the capital increase from 25,213,136.5 $ to 25,560,973.5 $, the company's management preferring to extend its activity onto a series of new markets, still unexplored, as the ones in Oriental Asia.

➔ in 2007, an increase of the financial debt is seen, compared to the previous year, to + 1,987,000 $, that is 5.64%; an EBITDA reduction of – 135,000 $, meaning 2.38%; a diminution of EBIT by -72,000 $, meaning 2.69%, the management preferring to continue activity and maintain capital, no capital increase being seen, to attract new shareholders. It is important to emphasize that this company faced a new scenario given that in Oriental Asia the fiscal variables were a lot higher compared to the other regulated market the group acts onto.

➔ in 2008, the financial debt increases compared to the previous two years: compared to 2006, by 3.990.000$ (11,34%), compared to 2007 by 2.003.000$ (5,39%); EBITDA significantly increases compared to 2006 by 665.000$ (11,73%) and compared to 2007 by 800.000$ (14,45%): EBIT also increases compared to 2006 by 874.000$ (32,61%), and compared to 2007 by 946.000$ (36,28%). After the made analyses, the decisions were: to extend activity, hire new staff, due to positive results (significantly increased) obtained in that year by the Oriental Asia branch; no capital increase is seen, duet o the raised inflation indices and the fiscal variables that did not diminish, but were raised in the previous year. It may be

seem that neither în the third year no decision is made on capital increase or attracting new investors.

Based on the alternative performance indicators, the in-debt degree of the group and taking into account the main obstacles that can be at the base of decisions-making, the behaviors of the human factor in various situations can be analyzed.

The second part of the case study is dedicated to feeding these data to one of the most performing Expert System, the decisions made by it succeeding in confronting the two decisional types.

1. Identifying the problem. Taking into consideration the decision made by the human expert when all of the data in the upper table were available, an expert system generator can be used (Exsys) to take the information, and depending on the rules that the cognotician and the domain expert establish alternatives should appear.

2. Acquiring knowledge. From the cognotician's talk to the domain expert, essential requirements that will lead to making rules were separated.

Qualifiers: EBIT, EBITDA, Financial Debt.

Conclusions: extending the company activity; continuing the company activity; hiring personnel; increase capital; maintain the existent capital.

As already known, the information present in the knowledge base are described by production rules whose syntax has this form:

IF condition THEN conclusion

or

IF condition THEN conclusion1 ELSE conclusion2

The assembly of these rules, by the way they interconnect, define a knowledge graph, in which the knots represent conditions or conclusions.

In order to define this graph, the rules defining the strategy will be introduced.

These rules will be introduced based on the next decisional table (of production lines). It is provided by the accountant expert, based on the domain legislation (see table 2).

Table no. 2. Decisional table for production rules

EBITDA and EBIT		**Financial Debt**		
		Increases	**Decreases**	**Stagnates**
	Increases	EA=5; M=5; AP=2	EA=8; M=8; AP=7	EA=6; M=5; AP=3
	Decreases	MA=5 MC=5	MA=7 MC=7	MA=6 MC=8
	Stagnates	MA=2 MC=1	MA=3 MC=2	MA=10 MC=10

M=capital increase MC= capital maintenance; AP= hiring personnel;
MA=maintaining activity; EA=extending activity

Each qualifier has a credibility noted (on a 1 to 10 scale), for each conclusion.

4. Conclusions

After confronting the two types of decisions, the following conclusions were reached:

- In 2006, the Expert System, unlike the human factor, makes a series of more audacious decisions that are: *increase capital with certainty factor 5, extending activity with probability 5, and hiring personnel with probability 2.*
- In 2007, the ES makes these decisions: *increase capital with factor 5 and maintaining activity by factor 5.*
- In 2008, the ES makes the following decisions: *increase capital with certainty factor 5, extending activity with probability 5, hiring personnel with probability 2.*

The expert system also makes a forecast for other cases such as the ones presented in table 2.

After analyzing these decisions, it may be seen that the ES offers, each time, more solutions, which makes seen the fact that prudence principle, on which the accounting of Continental Europe is based on, is not so familiar to the ES.

Another conclusion is that the ES can be a true help to the human factor in making decisions, but certain aspects on professional reasoning and the economical-financial domain which can suffer significant changes in very short periods of time can be omitted within an ES. Nevertheless, continuous improvements will take place, taking into consideration the speed of the technical progress.

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