THE NECESSITY OF USING EXPERT SYSTEMS IN STRATEGIC DECISION MAKING

Miloš Dašić*, Slaviša Trajković**, Branko Tešanović***

*Military Academy, Belgrade
**Faculty of Economics, Priština - Kosovska Mitrovica
***Military Academy, Belgrade

Abstract: Strategic management is an extremely complex process of monitoring and collecting all relevant information on different internal and external critical success factors, which affect or may affect the operations of a company. On the other hand, all collected information should be adequately processed and presented, in order to reach managerial quality. For strategic decision making, it is not sufficient to obtain relevant representative information and indicators, which give insight into the existing business environment and the current strength of the company, because the choice of future development strategies is often directly connected to intuition, assessment and personal reasoning of decision makers. Expert knowledge is often unavailable at the time when it is required to solve complex problems, because there are only a few people in each company who are considered experts and they are often too busy. The appointment of other experts for each complex strategic problem is in most cases expensive and irrational, if not impossible. Therefore, the use of expert knowledge in the form of expert systems is a considerably cheaper, more rational and more accessible way of solving problems in the field of strategic management.

Keywords: expert systems, strategic management, information, knowledge, decision making, artificial intelligence

INTRODUCTION

The necessity of using expert systems in strategic management is constantly increasing, especially under strong dynamics of change within business environment. If this process is to be successful and efficient, it is essential that the person who makes decisions on future development strategies be an expert in the field of the issue he is trying to solve and to have sufficient experience in order to decide how to react in the exisiting business conditions. Prompt response to changes in existing business conditions involves practical problem-solving in real time. The availability of expert knowledge at all times in certain problematic areas, which is possible with a well-designed expert system, is an important success factor in modern companies. Late decisions are often equally detrimental as the wrong ones, and so the company's possibility to use a certain expert system for its business management at the moment when it needs to

provide a quick response to change, constitutes an important element of gaining advantage over the competition.

Expert systems in strategic management don't aim to fully replace humans in strategic decision making. However, they can serve as an extremely useful expert adviser for numerous management issues, as they have the possibility of reasoning on an expert level in a given field. Due to complexity and lack of structure, which is characteristic of the problems within strategic management, it is possible to solve them with the help of expert systems. Great interdependence of certain factors on business results and future development guidelines leaves space to strategic decision makers to use empirical and heuristic knowledge, which on the other hand implies the need to formalize such knowledge in a programme. In that respect, expert systems offer great possibilities, which, if used correctly, guarantee business success.

THE APPLICATION AREA OF EXPERT SYSTEMS IN STRATEGIC MANAGEMENT

The use of expert systems in strategic management has considerably enhanced efficiency and consistence levels of strategic decisions which were based on them. It is best expressed in the manner, quality and time dimension of a decision making process. Adequate application of the portfolio concept, one of basic instruments of strategic management, has become more successful since expert knowledge became constantly available for an unlimited number of problems in the field. In that way the assessment of conditions in which companies conduct their business and the extent of their abilities to respond to the existing as well as future challenges, with the choice of appropriate development strategies, can be conducted on an expert level at any moment and for an unlimited number of requests. With decreased impact of the human factor, management decisions that were based on the use of expert systems were standardized to a great extent, without subjective impact and bias from the decision maker. [3]

With the use of expert systems in strategic management, there have been changes in the organization of the management structure within a company. These changes are reflected in the management hierarchy within the company, where the authority at middle and senior management levels can be transferred to lower levels, since even complex management problems can be successfully solved within the scope of operations management with the help of expert systems. Thus additional time is left to middle and senior managers, which they

could use to solve other management problems within the company. Therefore, the functioning of the entire management system in the company is raised to a higher quality level.

As possible application areas of expert systems in strategic management, there are all segments of this complex process which can be considered difficult enough to require a certain level of expertise in their realization. These are mostly the fields in which adequate software solutions, or expert systems, can serve as a strong support for strategic analysis, strategic choice and finally, strategic change. We should stress the following as the most significant possible application areas of expert systems in strategic management:

▪ Strategic analysis of turbulent business environments in the conditions of discontinued changes,
▪ Script development for strategic planning and assessment,
▪ Trend analysis, cross-sectional analysis for long-term assessment and multifactor analysis,
▪ Strategic planning and sensitivity analysis,
▪ Risk assessment,
▪ Experience curve analysis,
▪ Opportunities and threats analysis, as well as strategic changes in the formulation of an adequate business policy,
▪ Development of the company's strategic plan
▪ Identification and selection of particular programs and projects whose implementation should be supported,
▪ Financial analysis for strategic management, etc.

Each of these fields of strategic management has its own specific qualities, which have to be taken into account in the assessment and development of an expert system, which would solve the problems in that field. We should also pay attention to the adequate choice of tools with which particular expert system will be developed, as it has to reflect the structure of the requests presented before the system in order to properly deal with the problem.

Expert systems are not "tutors" and their decisions are not binding, in the sense of giving out directives how to solve a certain problem. For their successful implementation, they are to be understood as a man's good expert "consultant", his objective "business partner", which considerably helps him to be more successful in his business. The decisions of expert systems must be interpreted as "good advice" which can, but doesn't have to be accepted by a man as the final decision maker. However, if it is a well-designed expert system, then its

advice mostly represents the right guidelines to more successful management, which could lead to positive outcome in future business operations.

THE POSSIBILITIES AND LIMITATIONS OF EXPERT SYSTEMS IN STRATEGIC DECISION MAKING

The need to constantly combine strategic skills and expert experience, along with indispensable information and methods, techniques and concepts of their adequate analysis contibuted to the fact that scientific research in the field of strategic management was increasingly marked with the concept of expert systems. The growing need for expert knowledge in problem solving within strategic management can be most efficiently solved with the use of software solutions in the form of expert rules, which would enable skills, experience, intuition and heuristic knowledge to be used in real time and for an unlimited number of problematic situations in the field.

The idea and awareness that the strength of intelligent programmes, for overcoming specific and complex problems, doesn't stem from formalism and conclusion schemes, was the basis for the development of specific programmes, with special purpose, which have expert role in the area of existing problems. These programmes are called expert systems and are the dawn of a new era in artificial intelligence and information technologies research, which is exponentially increasing and developing. The application of expert systems in strategic management involves prior completion of certain conditions, regarding the possibilities of realising such a complex project.

Each of the potential projects should meet certain requirements and qualities before implementation into business operations. The requirements and characteristics are as following [1]:

1. Basic requirements:

- The need to access knowledge-based systems;
- The existence (availability) of experts;
- The possibility of engaging experts;
- Acceptable limited success;
- Profitability;
- Risk assessment in relation to profit;

2.   The type of problems:

- Symbolic reasoning;
- The use of heuristics;
- Incomplete and unreliable information;
- The development of expert systems for solving actual organizational problems;
- Widespread knowledge and general understanding;
- Task definition;
- The availability of task inputs;
- The adequacy of task outputs.

3.   Expertise:

- Experts are considerably better in task realization than "amateurs";
- The necessity of expertise;
- The adequacy of an expert;

4.   Task limitations:

- The limitations of task difficulty (neither too easy, nor too complex);
- The assessment of the lower level of task knowledge;
- The assessment of the upper level of task knowledge;
- The narrowness of the task.

5.   The personnel of the domain area and policy:

- Staff expectations in the field of expertise concerning the success of an expert system;
- Agreement and acceptance of cooperation between the leaders (managers, planners, etc) in domain area;
- The support from the highest management level within the organization;
- The users want a system;
- The implementation of a system into business operations with minimal changes in the existing processes;
- The cooperation of the user group;
- The implementation (results) of expert systems in domain area won't be sensitive or controversial towards the organization's policy;

6.   Development, testing and application:

- Incomplete coverage of the domain (task) can be tolerated and the system can be applied in phases;
- The possibility of decomposing the entire task to subtasks and the series of development steps;
- Learning ability;
- Written material;
- The availability of test cases;
- User interface;
- Long-term need for a system;
- Non-existence of alternatives;
- Stability;
- Tolerance to incorrect results;
- Measuring the contribution;
- The experts' consent to corrections.

The main aim of fulfilling the stated requirements is to choose the domain which would be most suitable for the project of the expert system.

Changes occurring in business environment pertain to technologies and products, but above all, to knowledge resources. The development of production forces within a society is conditioned by the development of cognitive processes about the nature and the society, and also by the development of general human knowledge. This process can especially be complemented by expert systems. As intelligent automatic devices for the representation and processing of general, natural, exact and verified knowledge, linking the examined and confirmed, but vague knowledge gathered from several years of expert experience, expert systems provide insight into new expert fields and realization of adequate complex processes. Since expert systems enable highly specialized knowledge, i.e. expert knowledge, to be spread and actively represented within certain expert fields of strategic management, then the management quality of the entire company which is using the expert system is raised to a higher level. In that way, expert systems become a success factor of modern companies in the business world, and in the long run they will also be a prerequisite for the development of the entire economy and human society in general, as a unity in many different and specific intelligent teams.

Expert systems possess many significant qualities which distinguish them from other characteristic information technologies, such as automatic data processing, management information systems, decision support systems, etc. The representation of significant features of expert systems can best be fulfilled by highlighting some of their drawbacks and limitations in their use within strategic management process. These drawbacks essentially represent favourable characteristics which the existing expert systems don't possess to a desired extent and indicate possible directions of their development and improvement in the future.

These drawbacks are expressed in the following [2]:

- expert systems cannot recognize, nor solve the problems for which their knowledge is inapplicable or insufficient;
- expert systems don't have independent resources to check the rationality of their conclusions;
- expert systems don't have enough knowledge of their possibilities and limitations (which is characteristic of a human expert);
- explanations that the expert systems give about their conclusions and reasoning are often too simplified;
- the language used by expert systems for stating facts and relations is very limited.
- when it comes to future development areas for expert systems, we should stress their improvement when dealing with certain types of problems, which could be described as generally unfavourable for existing expert systems, such as:
- the problems which have only a few solution rules;
- the problems which have too many solution rules;
- well-structured numerical problems;
- the problems which the humans solve much better with their senses of sight, smell, touch, etc;
- the problems which are too complex or new, so that there are no experts in that particular field;
- the problems in the fields where experts are in total disagreement over their solutions [4].

In current development phases and practical realization of numerous projects, the application of expert systems in strategic management has given outstanding results. Many complex problems, regarding the choice of an alternative strategic decision, have been successfully solved with the use of expert systems in

different segments of the complex strategic management process. For most of these problems, the level of expert knowledge required for their solution and the frequent need for their solution are so great that they practically stress the necessity of using expert systems.

Although the human role in strategic management is still irreplaceable, the use of expert systems as a complementary tool and a highly expert consultant is so important that it is expected to become a necessary condition for further development and growth of the company in the foreseeable future.

CONCLUSION

Reaching important strategic decisions and the choice between strategic alternatives in existing complex business conditions require the use of expert knowledge. Since the age we live in is often regarded as „information age", the survival, development and business success of modern companies inevitably involves operations that are based on the use of cutting-edge IT achievements, in the field of hardware as well as software solutions. In that respect, the use of expert systems proved to be one of the finest cutting-edge software solutions, which enabled access to expert knowledge to a large number of users at all times.

At the time of globalized world economy, turbulent business environment and business dynamism increase on a daily basis, which undoubtedly requires latest cutting-edge methods of following all critical factors that could affect business success of the company. Today, successful strategic management and decision making is inconceivable without combining a great number of adequate information with different methods of processing and presentation, which, because of the relevance of obtained results, must be conducted in a very short period of time. On the other hand, all these mathematic and other methods of information processing are not always sufficient to reach appropriate decisions. We often see that without intuition and expert experience efficient problem solving fails to happen, despite adequate level of information.

In strategic management today, expert systems are offering the ability to combine relevant information with required expert knowledge. It is formulated in a suitable computer programme, in order to reach the best solution to the problem. The perspectives of applying expert systems in strategic management show a rising trend. In the foreseeable future they aim to reach the level of necessity, in order to ensure success in contemporary business world. The

complex process of strategic management requires further changes in the approach of strategic problem solving, while expert systems provide great possibilities of modernization and automatization of this action.

REFERENCES:

1. Preraue, D. S.: *Developing and Managing Expert Systems*, Addison Wesley Publishing Company, New York, 1990.

2. Stojmirović, Lj., Trajković, S., Stojmirović, S.: *Menadžment informacioni sistemi,* FAM- Fakultet za menadžment, Beograd, 2006.

3. Tešanović B., Zogović.: *Koncept totalnog upravljanja kvalitetom sa posebnim osvrtom na Vojsku Srbije,* Beograd, *Vojno delo*, 3/2000. str. 170. ISSN 0042-8426..

4. Trajković, S.: *Ekspertni sistemi u strategijskom upravljanju*, Kosovska Mitrovica, Ekonomski fakultet, 2010.