CONDITIONS AND OPPORTUNITIES FOR DYNAMIC ENTREPRENEURSHIP IN SLOVENIA

Abstract of Doctoral Thesis

Even in the present day, at the beginning of the 21st century, many people in Slovenia associate entrepreneurship with the creation of new small enterprises founded by individual entrepreneurs and, all the more frequently, by entrepreneurial teams. This is surely a reflection of the past when both, in theory and in everyday life, the role of an individual in creating new value in the commercial sector was narrowed down to smaller economic units, small enterprises, crafts and small trades; every “bigger” entity was in the “social ownership or owned by the state”, or “foreign” – not only in regards to the owners, but also foreign to our values. Only slowly does the awareness penetrate into our mind that entrepreneurship is the most relevant philosophy of progress and that it is the entrepreneurs who implement new technologies, create new value and enable an all-round public, cultural, social as well as personal development.

Some countries are known to be more entrepreneurial, other less, some aim to be entrepreneurially oriented, in others prevails the opinion that entrepreneurship is something not very positive or attractive, even contrary. There are countries in which the entrepreneurial lifestyle is normal, imparted to the children from their early age, and others again where the promotion of entrepreneurship has only started recently (again) … Which countries can be labelled as the more entrepreneurial ones? Mainly those in which entrepreneurship and the entrepreneurial spirit are recognized as their major values, supporting the entry and growth of new enterprises.

In Slovenia, like in other countries of Central Europe, the general public opinion still does not favour entrepreneurship highly. The prevailing viewpoint presumes that entrepreneurship involves high social differentiation, that entrepreneurs make people work hard and that they appropriate the added value created by employees, that entrepreneurship means getting unduly rich, speculation, etc. However, this is contrary to the entrepreneurial philosophy as accepted in the more entrepreneurial countries, in which entrepreneurs are appreciated as heroes who are changing the world and customs, generating progress and creating added value.

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How to stimulate the “propelling power”, the “engine” of entrepreneurship – the fast-growing, dynamic enterprises that are the only ones to generate economic growth and added value (as recognised by David Birch; 1987) also in Slovenia? How to create the conditions and opportunities for the prosperity of the most dynamic part of economy?

Challenged by this issue, we launched a long-term research project into the prerequisite conditions and possibilities for the development of dynamic entrepreneurship in Slovenia. The results of this research are outlined in authors’ doctoral thesis that contains the following nine base chapters: (1) Issues and goals of research; (2) Understanding and positioning of entrepreneurship; (3) Dynamic entrepreneurship and characteristics of dynamic enterprises; (4) Developing the research model; (5) Research methodology; (6) Attributes of dynamic enterprises in Slovenia; (7) Differences in the factors influencing dynamic entrepreneurship between Slovenia and the EU; (8) Machine learning based on the cases of dynamic enterprises; and (9) Conditions and opportunities for dynamic entrepreneurship in Slovenia; and Attachments.

RESEARCH GOALS

The reasons underlying for the research on dynamic entrepreneurship in Slovenia are as follows: (1) firstly, we believe that Slovenian economy vitally depends on the successful growth of the most dynamic part of small enterprises that will manage to overcome the »growth pains«; (2) secondly, we wish to find what external (environmental) and internal factors stimulate or impede the growth of dynamic enterprises in Slovenia; (3) our wish to establish which factors are the most relevant in identifying the potential of dynamic enterprises - the so-called gazelles, and their chances for success.

Moreover, with this research we also wish to contribute to (4) improve the knowledge of the factors of dynamic entrepreneurship and their effectiveness on dynamic entrepreneurs, (5) a more successful and efficient managing the growth of dynamic enterprises, (6) developing a testing expert system to identify dynamic enterprises and their more successful and efficient administration and management, and lastly (7), to shape the governmental policy in relation to entrepreneurship, or influence the planning stage of the policy to promote entrepreneurship, in particular the dynamic entrepreneurship, as a relevant creator of jobs and economic development.

CLASSIFYING THE ENTREPRENEURSHIP, DYNAMIC ENTREPRENEURSHIP AND FORMATION OF RESEARCH HYPOTHESES
We have established that entrepreneurship, entrepreneur and the enterprising organization have their role in the economic science as well as in business science and that entrepreneurship cannot be automatically equated or restricted to the »small business« only, or to the creation of new enterprises, although it is true that both in literature and in everyday life this connection is very frequent and can be attributed to the fact that new economic entities do not emerge unless there is an entrepreneurial approach and entrepreneurs. On the other hand, there are many economic entities in the small business sector that do not act in an entrepreneurial way, or do not have any potential for growth, or do not wish to generate growth.

We have founded the necessity of an interdisciplinary treatment of entrepreneurship as a socio-economic phenomenon of the twentieth and twenty-first century, linking at least three basic approaches: (1) the economic aspect: from the macro-economic and socio-economic aspects we can establish, assess and measure the contribution of »entrepreneurship« to the economic growth, employment, advanced stage of the country's economy, and the prosperity of the society. From the micro-economic viewpoint, we can establish the economic effects of individual entrepreneurial entities, their optimum size to achieve the expected return and balance the use of resources to achieve the maximum effects; (2) the business-organisational aspect helps us to assure the economic goals in an entrepreneurial organization – an enterprise – and administer and manage the business functions that are prerequisite for the specialization of entrepreneurship to achieve the economic and socio-economic goals; (3) the aspect of entrepreneurial management and entrepreneurial behaviour allows us to clarify, to a certain extent, what the entrepreneurial handling and conduct of the entrepreneur (or the entrepreneurial team, resp.) and the entrepreneurial organization should be like to be able to apply the professional techniques and models developed by the business and organizational science and achieve economic, as well as non-economic goals as set by the entrepreneur and all other players entering the organizational relationship.

We have restricted our study of entrepreneurship to a narrower scope – the dynamic entrepreneurship. This has proved to have an exceptional macro-economic role, and the growth of the most dynamic enterprises contributes crucially to the growth of national economies, social prosperity, the opportunities for jobs, technological progress and development, and also creates the highest added value.

Dynamic entrepreneurship has been defined in great detail in the framework of the theory of growth (Penrose, 1995), by models and factors of growth divided into the environmental and internal ones (the enterprise and entrepreneur), by the motivation for growth (and harvest), by the strategies of growth, as well as by the management systems and development of the organization of enterprise. In the long run, the growth stands for the profit – i.e. the harvest for
the entrepreneur who has identified and seized a market opportunity, and developed, on the basis of his clear vision and harvest expectation, a proactive strategy of growth and organization throughout all the organizational stages up to the corporate entrepreneurship (Tajnikar, 2000). Dynamic enterprises are led by dynamic entrepreneurs who create the change and have an effect on the environment, are innovative and successful in the long-run, which can be measured by financial and non-financial indices, and whose business strategies are competitiveness, internationalization and globalization.

Dynamic enterprises can be found in all developmental stages of an enterprise, not only in the so-called stage of growth; the long-term growth is related to, and depends on, the assertion of the leadership professionalisation and the development of an entrepreneurial and managerial team, as well as on an advanced, professional organizational structure, tailored to the nature of the business. Underlying for the dynamic enterprise leadership is the understanding and awareness of the management techniques of a growing enterprise, which means that we cannot expect the most dynamic enterprises to be led by entrepreneurs individuals, but by strong entrepreneurial and management teams, under the lead of an influential entrepreneur or an entrepreneurial manager, who is not necessarily the founder of the enterprise.

The study of the current cognizance has proved that the growth of (dynamic) enterprises depends on certain factors: (1) the business environment, (2) the entrepreneur and/or the entrepreneurial-managerial team and their capability, (3) the attitude of the entrepreneur and the enterprise to innovation, development and research activities, and introducing changes, (4) the strategy or model of growth and harvest, (5) the management system and business model, (6) the employees and human resources management, and (7) the financing of growth. The factors of growth have an external – environmental (1) and internal component (2-7).

In the dissertation, the similarities and differences in the interplay of these factors and individual principles on the dynamic enterprises in Slovenia were scrutinized and compared with the dynamic enterprises in the European Union (EU). In Slovenia we already have dynamic enterprises and dynamic entrepreneurs that can be categorized, according to the EU criteria, among the fastest growing dynamic enterprises in Europe. Our thesis is that the dynamic enterprises in Slovenia emerge and operate in the characteristic, but different internal and external conditions that are relevant for the fast growth of enterprises. In order to accelerate the enterprise growth and support to the dynamic entrepreneurship, we should at least provide for similar conditions in the environment and inside the fast-growing enterprises, as the dynamic enterprises in Europe have. If we identify these differences, we could stimulate the activities that should lead to provide similar conditions for dynamic entrepreneurs in the
near future, such as the European dynamic enterprises enjoy now. Therefore, our fundamental hypothesis shall read:

- The external and internal factors influencing dynamic growth of Slovenian (H) dynamic enterprises (H) are characteristically different from the factors affecting the dynamic enterprises in Europe at the turn of the 20th century.

For the purpose of international comparability in the more advanced stages, we have adopted the factors and attributes affecting the growth and success of dynamic enterprises from the European research (Roure et. al., 1999; Mei-Pochtler, 1999). The growth and success of dynamic enterprises were measured according to seven standard criteria: the DaBEG² index, the total revenue growth rate, the revenue profit growth rate, the capital profitability growth rate, the assets profitability growth rate, and the profit per employee growth rate.

On this basis we re-shaped the basic hypothesis (H) and applied it as the basic working hypothesis (H1), analyzed it and developed several working hypotheses concerning the difference of individual factors of growth.

- The growth of dynamic enterprises in Slovenia depends on the factors of dynamic entrepreneurship that are characteristically different from the factors in the EU.

The results of verifying this hypothesis (H1) also served as the basis for the verification of the basic hypothesis (H) that was defined in the disposition as the central hypothesis in our research.

The confirmation or rejection of the assumed hypothesis (H1) is in fact a relevant groundwork for the future planning of the business environment and handling of entrepreneurs, however, it does not provide an answer to one of the fundamental issues that were set as the goals of this thesis, i.e. how to recognize and identify a dynamic enterprise, or how to establish whether an enterprise has a potential for growth or not, on the basis of a minimum number of attributes. Therefore we have made a step further in our research and put to the test the next hypothesis:

\[ DaBEG = \left(\frac{z_{tn} - z_{tn-5}}{z_{tn-5}}\right) \times \frac{z_{tn}}{z_{tn-5}} \]

where the symbol \( z \) stands for the absolute number of employees in a given year (tn)

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² DaBEG Index (Birch, 1987; 36-37), measuring the relative and absolute growth of employment:
Some factors affecting faster growth of dynamic enterprises are much more important than others, thus they enable to forecast success and growth of dynamic enterprises.

The verification of this hypothesis is useful not only for entrepreneurs who lead dynamic enterprises, and for the investors, but also for the environment that can establish conditions for a faster growth of dynamic enterprises.

RESEARCH MODEL AND METHODOLOGY

We have developed a research model to verify both hypotheses herein and taken those external and internal or environmental attributes that were identified as characteristic by the researchers of European gazelles (Mei-Pochtler, 1999; 97–104). The six factors with 17 external-environmental attributes, and 14 internal-environmental attributes are shown in Figure 1.

Figure 1. Factors and Attributes of fast growth of dynamic enterprises in the EU – research model

Source: Adapted from Mei-Pochtler, 1999.
To verify the differences in growth factors between Slovenian and European dynamic enterprises, we have selected from the database of all enterprises in Slovenia such enterprises that satisfied certain criteria, and checked them additionally against the criteria of growth as specified on page 5. The criteria that were applied to select the most dynamic enterprises are equal to the criteria applied for the selection of the European dynamic enterprises – the Europe's 5000 (GrowthPlus, 2001). These criteria are:

- The entrepreneur owns no less than 15% of the enterprise’s capital stock, or no less than 5% of shares, in enterprises quoted on the stock exchange;
- The enterprise is not part of a holding or another enterprise, and the outside institutional investor has no more than 50% of the capital stock in the enterprise;
- In the relevant five-year term, the average revenue growth is no less than 50%, in nominal terms;
- Both the growth of sales and revenues, as well as the growth of employment should be more a result of the enterprise’s organic growth than of mergers and acquisitions;
- At the end of the studied term, the enterprise should generate profit, however, exceptions are possible, as fast growth does not show profits always.
- The enterprise must have no less than 50 employees in the last year of study, and no more than 5000 in the first year of study (the growth of employment measured by \( \text{DaBEG} \geq 20 \))
- Enterprises must be older than five years.

For the comparison we also used the original database of Slovenian dynamic enterprises from the research 1990-1993 (Žižek & Lichtenstein, 1994), and the database of dynamic enterprises from the research by the European gazelle association – the GrowthPlus (Roure, 2001), supplemented by the questionnaires taken in 2001. The basic data on dynamic enterprises databases applied in our research are shown in Table 1.

To compile the descriptive data, opinions and viewpoints from entrepreneurs we have applied a questionnaire developed for the research on dynamic enterprises in Central and East Europe in 1993 (Žižek, Liechtenstein, 1994), and also in the first research on European dynamic enterprises in the year 1995 (EFER, 1996). The questionnaire had 87 questions that have yielded an overview of the attributes of dynamic entrepreneur and a dynamic enterprise, its employees, fixed assets, financing, performance, investment plans for the coming term, as well as of the business, tax and financial environment of dynamic enterprises.
Table 1. Basic data on the dynamic enterprises databases in the research

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<tr>
<td>Žižek 1994</td>
<td></td>
<td></td>
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<tr>
<td>Average age of enterprises</td>
<td>7.1</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Average age of entrepreneurs</td>
<td></td>
<td>43</td>
<td>41</td>
</tr>
<tr>
<td>Average volume of total revenues in mEUR</td>
<td>2,2</td>
<td>6,4</td>
<td>53,1</td>
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<tr>
<td>Average growth of total revenues % in the appl. term</td>
<td>105</td>
<td>386</td>
<td>318</td>
</tr>
<tr>
<td>Average no. of employees in the last year</td>
<td>26</td>
<td>98</td>
<td>754</td>
</tr>
<tr>
<td>Av.Total Rev.per employee in 000 EUR, last year</td>
<td>84,6</td>
<td>65,3</td>
<td>70,4</td>
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<tr>
<td>Aver. Employment growth in % in the appl. term</td>
<td>64,6</td>
<td>172</td>
<td>302</td>
</tr>
<tr>
<td>Sample size</td>
<td>150</td>
<td>175</td>
<td>93</td>
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As this questionnaire did not cover certain questions and attributes, we amended the underlying questionnaire on the basis of test results obtained from a sample of 94 dynamic enterprises in the year 1999 by adding 14 questions that enabled us to analyse the entrepreneur’s motivation, business and harvest strategy, the attitude to hiring consultants, and some others; the basic 87 questions were retained unchanged.

We approached to the verification of our hypothesis on the differences in factors affecting the dynamic enterprises in Slovenia and the EU, as well as to the additional hypothesis on the different weight of particular factors, in compliance with the research model and criteria on growth, by a statistical analysis of the differences in the responses by dynamic entrepreneurs in these three research projects, and by an alternative method to establish causal (cause-effect) connections between the attributes of the enterprises – i.e. one of the contemporary ‘artificial intelligence’ methods. For the statistical analysis we applied the t-test and the $\chi^2$ test to establish the differences in individual separate samples, while for the analysis of cause-effect relations we applied the induction of decision trees method (»data-mining«), or so-called »what-if« analysis, which is also applied in predicting the business development (Makridakis, 1990; Stevenson, 1998), however, it has not been used for the analysis of enterprise growth factors yet (according to our information). We have chosen the software application Weka that allows using various methods of machine learning with the same data.

The analysis of data by machine learning is a novel field of computer science dealing with the extraction of implicit, previously unknown and potentially useful information from databases (Witten & Frank, 2000). The key procedure of this methodology is machine learning, which includes automatic induction of decision trees, classification rules, regression
models and other types of models, from the data. The models derived with these techniques represent generalizations of the input data (or cases) and can be used for the classification, prediction and explanation of the explored phenomena.

The best explored and the most frequently used machine learning approach is learning from examples, also referred to as inductive machine learning. In this approach, examples of problem situations are submitted to a learning system (programme), which induces a general description of the underlying concepts useful for problem solving. The resulting concept descriptions can have the form of decision trees or if-then rules. Learning examples can often be very naturally described with attributes and classes. Attributes represent attributes from the considered domain, while class defines how an example with given attribute values is treated or classified.

We have varied the procedure of developing the decision tree by changing the parameters so as to obtain several models for each particular decision problem: these models give a differentially detailed insight into the concrete problem, and differ according to the accuracy of classification as well. The transparency and interpretability of these models are the features that generate a new quality in comparison with the results of statistical processing, which are normally a standard approach in the study of the growth of enterprises (such as in Solymossy, 1998; Wiklund, 1998).

Our analysis by means of decision trees comprised 134 most dynamic enterprises in Slovenia. Out of 320 descriptive and numerical data items on dynamic enterprises in our database, a subset of data were selected for the analysis. We excluded those attributes not containing information potentially relevant to the prediction of the enterprise growth, such as the company name, contact information, instructions on filling in the questionnaire etc. As a result, 158 data items were selected. However, some of these items were actually questions with more than one answer possible. To obtain clearer results in the data mining stage, these company attributes were transformed into multiple attributes with binary values.

THE FEATURES OF DYNAMIC ENTERPRISES IN SLOVENIA, AND DIFFERENCES BETWEEN SLOVENIAN AND EU GAZELLES

In Slovenian dynamic enterprises we have established that they have not changed considerably in the preceding ten years (internal – environmental factors of growth); on the other hand, the business, financial and tax environments have changed, as well as the attitude of the environment towards entrepreneurs, which has characteristically elicited more critical
remarks by the dynamic entrepreneurs involved in our current research than in the year 1994, however less critical than their European counterparts.

When measuring the impact of individual features of dynamic enterprises on our criteria on growth, we established that the DaBEG index of Slovenian dynamic enterprises in the past depended largely on the favourable governmental regulations, the level of remuneration for a dynamic entrepreneur, the age of the enterprise's equipment, the knowledge of the habits and behaviour of consumers, and the quality of the entrepreneurial team.

The growth of total revenues in dynamic enterprises depended on the company's activity (the highest was in building and construction), favourable governmental regulations and administration, the orientation to foreign (non-European) markets, the source of suppliers (suppliers from central and eastern Europe), and planning of investments in the future.

The growth of total revenues profits generated by dynamic enterprises was the highest in the branch of engineering, and depends on the entrepreneur’s opinion on the level of corporate profit tax: the profit can grow from year to year in the entrepreneur considers the tax rates reasonable. Likewise, the profit increased in the entrepreneur has been receiving the highest compensation for his or her current work, if the competition in his branch was not strong, and if the members of the managerial team contributed to the financing of growth.

Higher total capital profitability growth rates are found in the enterprises whose owner would set up an equal enterprise once more if he had an opportunity, or who pays a relatively low remuneration for his current work, whose employees are sufficiently qualified for work, and where the primary source of start-up capital (not of the founding capital) was their own capital.

The total assets profitability growth is affected by the problems in the transportation and communications, the social recognition or the recognition by the environment, the origin of the enterprise (if founded by the entrepreneur), the business activity, the remuneration to the management, and the expectation of the harvest, whereby the growth of profitability is adversely affected by a high remuneration to the management, a neutral attitude to the workers’ participation in the management, and by the entrepreneur himself if he has founded the enterprise merely to implement his idea and provide for his existence.

We also find that the responses of Slovenian and European dynamic entrepreneurs characteristically differ in the questions concerning a stimulating innovative environment and the transfer of R&D achievements into dynamic enterprises, in the expansion strategies to international markets, the tax bonus for co-ownership of employees and their participation in the profits, and all the factors of financial environment (accessibility of venture capital, the
efficiency of financial markets, and taxation on the retained profits and re-investments). In other environmental factors we have not found any considerable difference, or any difference at all.

In spite of that we can assume that the differences in the environmental impact on the growth of enterprises in Slovenia and Europe are important, which supports our hypothesis on the differences existing in the business, financial and fiscal environment of dynamic enterprises between Slovenia and the EU.

In the internal growth factors we find several characteristic differences mainly in the entrepreneur’s attitude to building up a solid organization. Dynamic enterprises in Slovenia are in their early developmental stages and the majority of them have not entered in the professionalisation stage. However, due to the large differences in the enterprise’s history between the Slovenian and European gazelles it would be rather unlikely to point to the typical differences in entrepreneurs, as the other three features of the EU gazelles (the attitude to internal entrepreneurship, leadership, a clear vision) are equally present in the Slovenian dynamic enterprises as well. The hypothesis on the differences emerging with this factor cannot be confirmed or rejected on the basis of such tests.

Big differences between the Slovenian and European dynamic entrepreneurs and enterprises were found in the attitude to innovation and in business strategies. In most answers to these two factors the answers differ greatly, which leads us to conclude that the hypotheses on the differences in these two factors can be confirmed.

In questions relating to the management system there were bigger differences as regards the features of the management system that point to an “organization that promotes growth and innovation”, and fewer differences in the attitude of the entrepreneur to the remuneration of employees and the management. The hypothesis on the differences in this factor cannot be fully rejected or confirmed.

Likewise, there is a lot of similarity with the European dynamic entrepreneurs in the attitude of dynamic entrepreneurs to employees. The differences are in particular in the responses to the questions on the loyalty and commitment of employees to the dynamic enterprise; in questions relating to work conditions, promotion, and possibilities for the participation in a growing enterprise we find more similarities than differences. Our hypothesis on the different effects of this factor can be rejected, with some reservation.

The greatest differences were found in the respondents’ opinions on financing the growing business, however, due to the different size and corporate life of these enterprises (and thus different phases in the corporate development and different phases of financing the enterprise)
we cannot cogently confirm the hypothesis on the differences between the EU and Slovenian dynamic enterprises regarding the financing and financial management.

In an overall view on the results of our statistical analysis we can conclude that significant differences emerge between Europe and Slovenia in the factors affecting growth, primarily in (1) the business environment, (2) the business strategies, (3) the attitude to innovation and (4) financing the growth; on the other hand, there are no important differences in the attitude of dynamic enterprises to (1) the employees and in dynamic (2) entrepreneurs themselves, however, we cannot, on the basis of our analysis, assess these differences in the scope of management which is, in fact, not developed yet in Slovenian dynamic enterprises.

We approached to the verification of differences by the alternative machine learning method (Data Mining).

FINDING THE DIFFERENCES BETWEEN SLOVENIAN AND EUROPEAN GAZELLES BY INDUCTIVE MACHINE LEARNING

In developing the decision trees by means of inductive machine learning method on examples we find that, based on the examples of 134 best dynamic enterprises, we can extract a number of rules by predicting numerically and non-numerically expressed attributes of dynamic enterprise and their successful growth; these rules can help us in defining the conditions for the fastest and successful growth of dynamic enterprises. Our predictions will be much more accurate in the future if we 'screen' the attributes of the dynamic enterprises by a questionnaire, developed by our own knowledge of the attributes of dynamic enterprises and entrepreneurs on the basis of this research, and in a still bigger number of successful dynamic enterprises from several countries.

To illustrate the applicability of this machine learning method on examples, we have presented an example of a decision tree for predicting the DaBEG index and planning the attitude of entrepreneurs to shareholders' options in gazelles. The first case is explained in full detail; in the second case only the fundamental information based on the decision trees are given.

**Predicting the DaBEG Index**

The calculation of the DaBEG index was shown in the footnote on page 5, the classes for the DaBEG index were decided in the following ranges:

- Class 1: DaBEG > 1000 (10.4% of the enterprises in the database),
- Class 2: 200 < DaBEG ≤ 1000 (11.2%),
- Class 3: $100 < \text{DaBEG} \leq 200$ (23.9%),
- Class 4: $\text{DaBEG} \leq 100$ (54.5%).

The classification accuracy is still acceptable when higher than the share of the majority class. An example of such a decision tree to predict the DaBEG index is shown in Figure 2. The classification accuracy of the decision tree on 134 training data is 72.4%, and on test data is 46.3% (transversal testing of the model obtained).

**Figure 2. The decision tree to predict the DaBEG Index**

The tree involves the following attributes of dynamic enterprises:
- A99-0: changes in business environment do not motivate me for a faster growth,
- A 19-0: a limited liability company
- A 19-1: a joint-stock company
- A 19-2: other form of corporation
- A 19-3: a sole trader
- A 94-3: the interest rate has the highest influence on the selection of the source of financing
- A 75-4: inefficient money management (surplus of finance remains in the account)
• A 97-1: no new jobs in the coming 5 years
• A 97-2: 1–9 new jobs
• A 97-3: 10–49 new jobs
• A 97-4: 50–99 new jobs
• A 97-5: 100–199 new jobs
• A 97-6: over 200 new jobs
• A 91-0: low cost for purchasing the raw materials and material are the enterprise’s main competitive advantage
• A 56-2: the average qualification structure of employees is secondary educational level
• A 123-0: tax policy does not stimulate the reinvestment of profits
• A 123-1: tax policy stimulates the reinvestment of profits
• A 123-2: tax policy does neither stimulate nor hinder profit reinvestment
• A 56-4: the average qualification structure of employees is post-secondary vocational level
• A 120-0: the dynamic entrepreneur has not experienced any difficulty with the licenses and registration of his enterprise
• A 46-2: establishing the entrepreneurial network would be main motivation for connections
• A 96-1: in the coming 5 years the enterprise will be investing in land and buildings

From this decision tree we can derive several rules to predict the DaBEG Index, however, we only list the rules to predict the highest class or value of the DaBEG Index above 1000 (such as in Birch’s “gazelles”).

1. Class
   IF (A99-0 = 0) & (A19 = 0) & (A75-4= 0) & (A97 = 0) OR (A99-0 = 0) & (A19 = 0) & (A75-4= 0) & (A97 = 1) OR (A99-0 = 0) & (A19 = 0) & (A75-4= 0) & (A97 = 4 ) OR (A99-0 = 0) & (A19 = 0) & (A75-4= 0) & (A97 = 5) THEN DaBEG > 1000

From these rules we can write the following findings to predict the highest values of the DaBEG Index (DaBEG>1000). In our database, such values were recorded in dynamic enterprises, that are:

(1) Limited liability companies, believing that the business environment could motivate them for higher growth, with efficient cash management, and do not plan new investments and opening new jobs;
(2) Limited liability companies, believing that the business environment could motivate them for higher growth, with efficient cash management, and planning new investments but not opening new jobs;

(3) Limited liability companies, believing that the business environment could motivate them for higher growth, with efficient cash management, and planning new investments and from 50 to 99 new jobs in the coming 5 years;

(4) Limited liability companies, believing that the business environment could motivate them for higher growth, with efficient cash management, and planning new investments and from 100 to 199 new jobs in the coming 5 years;

**Predicting the employees’ stock option plans**

The factors underlying the fast growth in European dynamic enterprises also involve the inclusion of employees as co-owners of a dynamic enterprise. We checked this attribute on the gazelles in our database, too. Possible replies (SOP) to the question “What do you think on the possibility for the workers to become shareholders in your company?” were:

- SOP = 0: no, on no account (22.4% of the enterprises in the database),
- SOP = 1: it makes no difference to me (4.5%),
- SOP = 2: maybe it could work, but I won’t commit myself to it (29.1%),
- SOP = 3: maybe it could work; I plan to undertake it (13.4%),
- SOP = 4: they are shareholders already; I am satisfied (19.4%),
- SOP = 5: they are shareholders already; I am not satisfied (3.7%).

The decision tree to predict the dynamic entrepreneur’s attitude to the employees’ stock option plans is shown in Figure 3. It achieves the classification accuracy of 66.1% on training data and 45.1% on test data.

The attributes in this decision tree are as follows:

- A20-5: employees are already co-owners of the enterprise,
- A26-5: the entrepreneur has at least a higher education level,
- A35-1: the main reason for starting up the enterprise was dissatisfaction in the previous business,
- A100-9: underlying the prevailing strategy for the coming three years is globalization with new products in new markets,
- A43-5: difficulties in payment recovery are currently the strongest factor affecting the business,
• A107: growth is mostly driven by the customer satisfaction approach applied by the employees,
• A89-3: main competitors to the dynamic enterprise are state-owned enterprises.

**Figure 3: Decision tree to predict employees’ stock option plans**

This decision tree can be interpreted in the following way:

1. Employees will not (SOP=0: ‘on no account’) be included into the shareholding structure in dynamic enterprises where
   1.1 Employees have not become owners yet, and the entrepreneur has a two-year college degree, the prevailing strategy for growth is not globalization, and in enterprises to which payment collection is causing the greatest difficulties;
   1.2 Employees have not become owners yet, and the entrepreneur has a two-year college degree, the prevailing strategy for growth is not globalization, and in enterprises that have not stated the greatest difficulty in payment collection, but in tough competition by the state-owned enterprises.

2. Employees will not (SOP=2: ‘maybe it could work, but I won’t commit myself to it’) be included into the shareholding structure in those dynamic enterprises, in which the
employees have not become owners yet, the entrepreneur completed a four-year college or university education, the prevailing strategy for growth is not globalization, their greatest difficulty is other than payment collection, the main (5 on the 1 to 5 scale) reason for growth is the customer satisfaction approach of the employees, and their main competitors are other than state-owned enterprises.

(3) Employees will most probably (SOP=3: ‘maybe it could work, I plan to undertake it’) be included into the shareholding structure in dynamic enterprises in which the employees have not become owners yet, and are led by an entrepreneur with college or university education, who has not started up the enterprise out of his/her dissatisfaction with previous business.

(4) In enterprises where employees are shareholders already and the entrepreneurs are satisfied with this (SOP=4: “they are shareholders already, I am satisfied”). Employees will be invited to become shareholders also in enterprises that are led by entrepreneurs with higher education who apply the strategy of growth with globalisation or introducing new products in new markets.

With more than 70 such decision trees and on the basis of data in the dynamic enterprise database, described with 158 financial and non-financial attributes, we have found in the dissertation that dynamic enterprises in Slovenia are subject to the following characteristic factors for the growth of dynamic enterprises in Europe.

(1) The growth of dynamic enterprises in Slovenia depends on the external environment attributes of the dynamic enterprise: from the 17 environmental factors that stimulate or hinder the growth in dynamic enterprises in Europe, only two in our decision trees remained without any descriptive attribute. These are: »the social recognition by the environment« and the »protection of intellectual property«. So we can conclude that the external environment affects the growth of Slovenian enterprises similarly as in Europe.

(2) The growth of dynamic enterprises in Slovenia depends on the entrepreneur or the entrepreneurial-management team; however, we have not recorded the most attributes from the EU among the factors of growth in Slovenia. The fundamental attribute: the vision and strategic management is the only factor stimulating the growth of dynamic entrepreneurs from the set of the European attributes that we obtained in our decision trees to predict the growth of dynamic enterprises in Slovenia. Other factors (building-up the organization, internal entrepreneurship, leadership) have not occurred in our results.
(3) The growth of dynamic enterprises in Slovenia depends on the innovation-friendly attitude and implementing the change, like in Europe, however, in the decision trees has not appeared any attribute pointing to the readiness of Slovenian entrepreneurs to assume a higher growth-related risk, which is a major characteristic of the European gazelles.

(4) The growth of dynamic enterprises in Slovenia depends on the selection and implementation of the business strategy (the strategy of growth), similarly as in Europe. The results obtained by means of decision trees revealed that the strategy of international expansion and strictly customer-centered orientation are the most important features in the Slovenian dynamic enterprises as well as in their European counterparts.

(5) The growth of dynamic enterprises in Slovenia depends on the features of the management system. The attributes of the European gazelles were identified in our results too, only that Slovenian dynamic entrepreneurs are more neutral than the European entrepreneurs to the relevance of the corporate organization, which is innovation-friendly, and that they do not find the employee remunerating system so important as their European counterparts.

(6) The growth of dynamic enterprises in Slovenia depends on the employees or conditions for work resp., promotion and responsibility, loyalty and commitment of employees to the enterprise, the possibility of participation in the growing concern and personal growth of the employees, very similarly as in the EU.

(7) The growth of dynamic enterprises in Slovenia also depends on financing the growth or development of the financial planning and management in a dynamic enterprise. However, considering the responses by the dynamic entrepreneurs in Europe and Slovenia, we may conclude that there are differences in the financial management and planning in dynamic enterprises.

CONCLUSIONS

If Slovenia is to become a prosperous country, get closer to the developed European economy and even overtake any of the EU countries in a decade or two (as some years ago Aleš Vahčič was ‘calling up’ in the Slovenian Economic Periodical (1995; 295–312), we need to follow the example of the entrepreneurially most developed and active countries (Glas, 2000). Knowing that some countries are more entrepreneurial than others (Reynolds et al., 2001), the most advanced and expressly entrepreneurially friendly countries that favour the emerging and growth of enterprises seem to be best suited as our model of development.
In view of Slovenia’s accession to the EU within a couple of years, we should in particular study the entrepreneurial policy of some European countries that allow for comparison with Slovenia. Our analysis has confirmed that the growth of enterprises in Slovenia is affected by more or less the same factors of growth as in the EU, bearing in mind that in some features, mainly relating to the business and financial environment, and with some internal-environmental factors as well, our gazelles are not yet comparable with their European counterparts.

Applying the method of machine learning on the cases of Slovenian dynamic enterprises as an alternative and complementary method of the growth factor analysis, we have confirmed that:

(1) There are attributes which are more relevant for the success of dynamic enterprises than other attributes,

(2) Such attributes are rather few in number, which facilitates identifying the successful dynamic enterprises with a growth potential.

Our research has proved that the growth factors found in the research of European dynamic enterprises can be ‘trusted’ and relied upon: we have identified a vast majority of these factors as key growth factors in Slovenian gazelles as well. Further research on dynamic entrepreneurship should focus, according to our findings and experience, on the most relevant growth factors and features that have proved successful in the research of the European and now Slovenia dynamic enterprises as well. Likewise, the social efforts should be directed towards setting up the identified conditions for a fast growth of enterprises, whereas on the enterprise level, the attributes common to the most successful gazelles in Slovenia and the EU should be highlighted.

LITERATURE AND REFERENCES:


