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ASSESSMENT OF INNOVATIVE FACTORS IN SELECTED LARGE ENTERPRISES IN THE CZECH REPUBLIC

Introduction

The emphasis on innovation and their management is still more and more actual question not only in developing ways of enterprises, but this question extends to enterprise viability. We believe that ideas of J.A. Schumpeter and P.F. Drucker (Drucker, 1993), (Bessant and Tidd, 2009) from the czech authors especially F. Valenta (2001) are still actual for successful realization of innovation. But besides that it is appropriate to perceive new findings and knowledge that are the result of changes in entrepreneurial environment, increasing competition, technology development, globalization factors in entrepreneurship etc.

From the dynamical evolution business can be divided into group of enterprises that build their conditions towards changes and improvement and group of enterprises that run their business in a standard way focused on costs reduction and resources rationality, it means those that miss innovative ability or they have lost it. Approximately fifteen years ago a M. J. Kiernan's book (1995) was published. This author paid attention to a group of innovative enterprises and he tried to outline characteristic of their innovative infrastructure for the nearest future. These ideas inspired us so that we decided to use this concept for innovative factors assessment and we decided to use a research probe.

The aim of the paper is to contribute to better cognition of innovative factors in the sphere of business and to find out the level of using these factors in the case of managing large enterprises in the Czech Republic. To reach this Kiernan's concept of innovation managing will be used.

1. Research probe methodology

1.1. Kiernan's concept

Kiernan points out these aspects of enterprise value potential that are usually missing or are only marginally detected in common enterprise balances. These aspects can finally decide on the ability of creating real and sustainable value for business. Kiernan's concept is focused on so called intellectual corporate base of the corporation. Intellectual capital is divided into three parts: human, stakeholder capital, and structural capital. This author deals with the question of finding and using intellectual corporate potential. He recommends focusing on innovative infrastructure that can help to enlarge innovative corporate base and overcome existing barriers. Kiernan worked out totally 11 commandments that should lead to development of innovative infrastructure and thus intellectual capital corporate base (see table 1, column 2).

Kiernan (1995) describes the commandments in more detail and demonstrates it in examples of corporations. He comes out of American environment. But corporations are chosen from approximately 20 countries and wide range of branches.

1.2. Operationalization

Our intention was to convert Kiernan's descriptive concept into usable form, it means if possible to draft empirically observable and measurable factors in business practice. We have faced very important methodological task to identify and to settle number of factors for particular Kiernan's criteria. Finally we have chosen an easy approach. Each commandment will be represented by one or maximum 2 factors – see table 1 – column 3 – assessed factors.

Table 1

Operationalization of Kiernan's concept

Serial number	Kiernan's concept	Operationalization		
	Commandments	Assessed factors (abilities)	Measurable field	Way of measurement
1	2	3	4	5
1.	They do not follow the rules prevailing in your field	Establishment/development of the business field	Business effect on the field in the last 3-5 years	Qualitative scale
2.	Get innovative, or get dead!	Innovative products or services	The share of revenues from products and services, not older than 4 years	The percentage scale

1	2	3	4	5
3.	Explore your business, find hidden assets and Make the most of them	Development project	Number of active projects	Qualitative scale
4.	Focus on speed and agility	The effect of the external environment	The ability to respond to changes in the business environment	Qualitative scale
5.	Be proactive and experiment	Experimenting in the enterprise	The willingness to experiment with	Qualitative scale
6.	Break down boundaries	Interdisciplinary cooperation	The ability to realize mutually beneficial cooperation with other	Qualitative scale
7.	Constantly take advantage of all the employees and everything they can	Intellectual potential of employees	Ability to use all the employees can do	Qualitative scale
8.	Globalize your real and knowledge base	National and multi-national contacts	Number of significant markets	Qualitative scale
9.	Acknowledge that eco industrial revolution affects all of us	Long-term survival of the business	Technological and managerial eco industrial activities	The range of case enumerations
10.	Make the continuing education of corporate religion	a) The organizational learning b) The intellectual base of enterprise	The role of education in the enterprise rate of utilization of the intellectual base	The range of case enumerations The percentage scale
11.	Create a monitoring tool for strategic benefits	Access to monitoring the strategic performance	Attention to measurement of strategic outcomes	Qualitative scale

Source: Own elaboration with using: M. Chráska: Metody pedagogického výzkumu. Základy kvantitativního výzkumu. Grada, Praha 2007.

For determination of the existence and assessment the character of individual factors in business practice, we have chosen the form of a questionnaire measuring scale, in a qualitative scale (very high conformity, high, average / normal in a given field /, low, very low, I do not know / do not check /), or in quantitative scale (e.g. conformity till 10 %, 20 %, etc.), or exemplary list of options.

We assumed that under the conditions of the Czech Republic, there are companies with developed innovative potential. We wanted to examine their frequency by using empirical probe according to Kiernan's concept. We were also looking for the answer to the question whether there are significant differences in the level of innovation infrastructure of the enterprises influenced by their size and ownership structure.

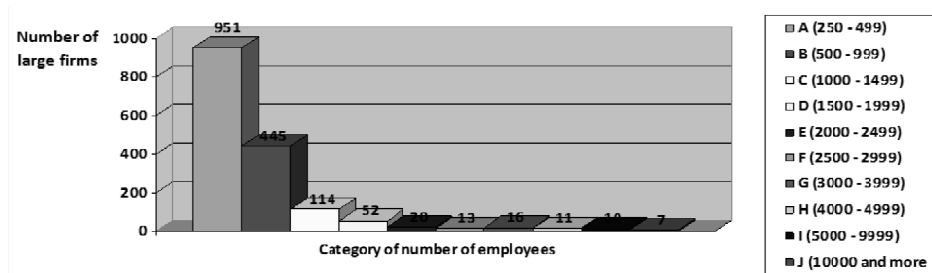
1.3. Preparation of the enterprises sample

The basic group of enterprises for realizing the probe comes out of the total number of 2224 active enterprise entities with 250 or more employees located in the Czech Republic. Data were provided to us by the Register of economic entities¹ of the Czech Statistical Office (CSO) – as of 31st December 2011.

In determining the size of the basic group the number of subjects was reduced. They were selected only active economic entities such as nonfinancial corporations (total number was 1639 units). Furthermore, the basic group was reduced to the two largest groups of large enterprises in the CSO classification by number of employees (see Figure 1). Basic research sample thus numbered 1369 enterprises it means 85 % of all large enterprises in the Czech Republic (951 businesses in category A, 445 businesses in category B).

Figure 1

Structure of large enterprises according to number of employees (as of 31st December 2011)



Source: Own elaboration with using data from the Czech Statistical Office (CSO).

From the settled basic group there was worked out sample of 352 enterprises by using a random number generator. These entities were contacted in the framework of our empirical questionnaire survey.

1.4. Questionnaire probe process

Questionnaire probe was carried out with the help of students of Faculty of Economics at VSB-TU Ostrava from 25th March till 15th April 2013. Students contacted companies assigned from the sample (352 subjects). Students used telephone or cell phone for contacting the enterprises. In the case of willingness of addressed representatives an electronic questionnaire was sent to them to fill

¹ For clarification: on 31st December 2011 in the Czech Republic there was registered 2 703 444 economic subjects, from that number 1 461 201 were economically active. Large enterprises account for about 0,15 % of all economic active entities in the Czech Republic.

in, or representatives were visited directly in the enterprise. Respondents had the option not to include the name of their enterprise or interviewer. 99 enterprises from the whole number of 352 entities were helpful to participate in questionnaire probe. These data represents our research sample.

1.5. Research sample characteristics

Research sample consists of 99 enterprises. These entities are active non-financial economic subjects.

The anonymity of the company. From 99 enterprises, 25 enterprises were anonymous. From 74 non-anonymous companies 60 % are from size category A (250-499 employees), the rest of the category belongs to B category (500-999 employees).

Specialization. The majority of respondents are non-anonymous companies (61%) and according to statistical classification of economic activities NACE they belong to the group C – manufacturing, which corresponds to the distribution of the majority of enterprises in the basic file.

Respondents' position in the company. About 60% of all respondents stayed in the position of owner, director or member of top management. The remaining respondents work at other positions in the company.

Enterprises' size. Approximately 70% of the companies were from the size category of 250 till 499 employees, 30% were from the category of 500 till 999 employees. This corresponds to the size structure of enterprises basic file (the real situation in the Czech Republic).

Organizational point of view. There was about 78% proprietarily independent (holding assets) companies the remaining enterprises were dependent on headquarter. The most common were proprietarily independent companies without affiliates (45%); firms with affiliates created a group of 32%.

Ownership structure. Foreign owners fully kept 39 % of the companies. Czech owners fully owned 46% of the financial holding companies. In 6% of companies the share of Czech property owners was greater than 50%. Share less than 50% was observed in the remaining 9 % of firms. Thus, in the research sample Czech owners proprietarily controlled 52% of companies (with property ownership of more than 50%).

1.6. The process and method of empirical data elaboration

Due to the mainly qualitative research focus of the probe simpler methods of processing were preferred. The aim was, to indicate a direction for more detailed analysis and further experimental and application steps in a general framework.

Frequency of occurrence. Observed rates (in absolute terms and as a percentage) were gained for each measured innovative factor. They served as the basis for economic analysis. Table 2 at the end of the paper contains commented results.

Table 2

Measurement of particular innovative factors

Factor number	Measured aspect of innovative factor	Measurement result (questioning)
1	2	3
1.	Enterprise impact on an economic branch in the last 3-5 years	<ul style="list-style-type: none"> – 40% of enterprises think that they could influence branch they do the business in (mainly new standard in their branch (22%), 5-7% mentioned creation of new branch, working out patents and licences, changing existing branch) – 60% of enterprises did not significantly influence their branch, it means companies do not care about branch development
2.	Share of new products and services (not older than 4 years) on total revenues	<ul style="list-style-type: none"> – 42% of enterprises have more than 30% of their revenues from new products and services – relatively big number of companies (17) have less than 10 % share of new products or services on revenues – many companies were not able to answer this question and this aspect is not monitored – the prediction to the nearest future (3-5 years) is quiet optimistic (slowly increasing share of new products)
3.	Number of active projects	<ul style="list-style-type: none"> – 44% of companies work on 4 or more projects – 30% of companies work on more than 2-3 projects – 14% of business respondents do not know about developing projects or these projects are not realized in their enterprise
4.	Ability to respond to the changes appearing in entrepreneurial environment	<ul style="list-style-type: none"> – 44% of companies have high level of ability to respond to changes in entrepreneurial environment – about 47% of companies assess their ability to respond as average (normal in given branch) – about 9% of companies have this ability low or very low
5.	Willingness to experiment	<ul style="list-style-type: none"> – 35% of enterprises stated high or very high tendency to experimenting – 35% of companies stated average tendency to experimenting – 19% of companies are under average (low or very low tendency to experiment)
6.	The ability to mutually beneficial cooperation with the others	<ul style="list-style-type: none"> – 42% of business respondents evaluate their beneficial cooperation as high or very high – 34% of companies evaluate this ability as average – 18% companies have low or very low ability to cooperate beneficially
7.	Ability to utilize everything the employees can	<ul style="list-style-type: none"> – more than half of business respondents (53%) suppose that their company can utilize own employees – 40% of companies can in average way (common in particular branch) utilize abilities of company's employees

1	2	3
8.	Number of significant markets	<ul style="list-style-type: none"> – the biggest group of companies is active at least 4 markets – 26% of business entities realize their activities at 2 or 3 markets – relatively high number of businesses were not able to answer this question or these companies do not monitor mentioned factor
9.	Technological and managerial ecological activities	<ul style="list-style-type: none"> – two thirds of firms say that they realize proactive technological and managerial precaution toward environmental protection, even 27% of companies claims that they are innovative and at the same time effective – about one third of companies do the steps in the sphere of environment protection only because of the requirements coming from outside (external enterprise environment) or they do not consider this question
10a.	The role of education in business	<ul style="list-style-type: none"> – 36 of companies consider education to be contributing to business performance growth significantly – in 55 of enterprises traditional established system of education dominates – in the case of 9 of businesses education is limited to necessary minimum or is not realized at all
10b.	Recognized level of utilizing intellectual base	<ul style="list-style-type: none"> – any respondent stated 100 utilizing of intellectual capital – 30% of respondents stated that they use intellectual capital in 80% – 23% of businesses use their intellectual capital from 50% – one third of respondents was not able to estimate the level of using intellectual potential in their company
11.	Importance of strategic results measurement	<ul style="list-style-type: none"> – the answers showed that in particular sample high and very high importance of strategic results measurement was noticed – it means about 65% of answers – in 30% of businesses this activity is average (common in particular branch)

Source: Own elaboration.

Scoring. Particular responses were individually scored in the range of 0 to 5 points. The highest level of innovation in each question was scored by 5 points. 0 points meant that respondents were not able to evaluate this factor or the factor was not checked in the company.

Reference model. It is considered as an etalon for assessing the level of implementing of individual innovation factors, respectively level to which the innovation factors are implemented in particular companies (see table 3). They also help to obtain a general picture of the level of innovation infrastructure of the whole sample of companies. Comparative reference level is always formed by the highest score that can be achieved for particular case.

Selective analysis. Analysis were realized by the assessment of possible differences in the sense of size and ownership structure of the sample of enterprises. Chi-square test was used for assessing.

Table 3

Reference model – assesment of innovative factors

Level of reaching reference level in %	Indication	Influence of innovative factors on company innovativeness
100-81	A	high, almost guaranteed with a significant positive effect
80-61	B	passable with some of the more progressive elements
60-41	C	problematic, significantly manifested stagnation elements
40-21	D	low, significantly manifested degeneration elements
20-0	E	unsatisfactory, state of emergency

Source: Own elaboration.

2. Gained findings from the research probe

2.1. From the factual point of view

Quality of innovative factors. From comparison of assessed empirical data from 99 enterprises with reference model (see table 4) results:

- collectively monitored enterprise sample shows passable situation of enterprise innovative infrastructure (assessment B), it means that outbalance more established forms of managing and implementing selected factors,
- particular innovative factors (except 1) are also at B level,
- from innovative factors of innovative infrastructure of enterprise the highest importance has approach to monitoring strategic performance of company,
- on the other hand company's impact on branch development appeared as problematic factor (assessment D where indicators of degeneration can be observed).

Table 4

Quality of innovative factors

Reference level	Index	Innovative factors											Total empirical level
		1	2	3	4	5	6	7	8	9	10	11	
5940	Sum of points	168	304	312	339	309	305	344	350	372	638	382	3823
100%	Level of reaching reference factor in %	33,9	61,4	63,0	68,4	62,4	61,6	69,4	70,7	75,1	64,4	77,1	64,3 %
A	Assessment	D	B	B	B	B	B	B	B	B	B	B	B

Note: Numbers means assessed innovative factors – see table 1.

Source: Own elaboration.

Level of innovative infrastructure. There are differences in the case we compare innovative infrastructure of particular companies (see table 5):

- in assessed sample there were 6 enterprises where innovative factors reached high level (assessment A); one enterprise seems to have excellent innovative infrastructure (with level of innovativeness over 90% comparing reference model),
- the largest group of enterprises (55 entities) achieved B evaluation – passable innovative infrastructure,
- numerous group is that with 37 enterprises that were evaluated at level C and it signals significant stagnation features,
- one enterprise was assessed at D level, which means degenerative manifests in innovative infrastructure.

Table 5

Enterprise classification according to assessment of their innovative infrastructure

Level of reaching reference status	Enterprise frequency	
	absolute	in %
A	6	6,0
B	55	55,6
C	37	37,4
D	1	1,0
E	0	0,0
Sum	99	100,0

Source: Own elaboration.

Size structure of enterprises. There were not significant differences between size category A (enterprises with 250 till 499 employees) and category B (with 500 till 999 employees). It resulted from statistical tests of test applied in empirical data and with high probability (95%) there are not important statistical differences. Thus size structure (enterprises from A category or B category) does not influence character of company's innovative infrastructure.

Enterprise ownership structure. Statistical test pointed out important difference between enterprises owned by foreign and Czech owners in the fact that foreign owners are active on foreign markets and have more contacts. The test did not show any other differences. Ownership structure probably belongs to factors that influence direction of company's innovative infrastructure and it is important to focus on it.

2.2. From the methodical point of view

Operationality problem. This part is considered by the authors to be one of the key area in the whole research task. Kiernan shows the direction. Their concretization into the application brings the risk of loss of continuity in the decomposition. Authors consider choosing appropriate way of interception of reciprocal relationships as very important (e.g. visualizing by using hierarchical graphs, tables, matrixes, etc.). In our case table form was used (see table 1).

Measurement of innovative infrastructure level. This part of research was focused on questions of comparing innovative factors and enterprises and depth of their knowledge. Key problem was gaining relevant information. These informations are not always directly monitored or publicly available. They are very often considered to be private. That is why we kept anonymity of enterprises. We are also aware of problems in the case of comparability gathered data among enterprises. Reached data mostly reflect relative relation in selected enterprise.

Sieve for classification of innovative factors and enterprises. Creation of reference model was found out as a good method while assessing empirical data. It enables (even roughly in our case) to divide monitored sample into groups and to look for practical commands for each of them.

Verification of analytical results. Empirical data, which we worked with, had statistical character (CSO) and soft data from questionnaire probe in enterprises. That is why authors decided to objectivize analytical findings from questionnaire probe. In order to reach that publicly available data about economic performances were also used. It was mainly used for that companies that were not anonymous and reached "A" assessment for their innovative infrastructure. Hard economic data presented very good economic results. At one company we recognized that obtaining foreign contract was positive impulse.

Conclusion

Empirical probe based on Kiernan conception of enterprise innovativeness brought several interesting findings. Innovations are in monitored sample of large companies in the Czech Republic still important challenge. Currently in management there are mostly observed common forms of innovative factors implementing. The question is whether it is sufficient for their further perspective and development. 2-5% of enterprises keeps stricter standard required for the level of managing innovative infrastructure. Lower level of implementing busi-

ness research and development seems to be quiet problematic area. Ownership aspects play an important role in innovative infrastructure directing even in subsidiaries in the Czech Republic. For real implementation in a company it would be beneficial to decompose innovative factors and progress their measurement into coherent system of indicators linked to strategic business performance.

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Summary

The paper is based on the authors' research activities realized in 2013. The main sense of this paper was to use a concept of M. J. Kiernan for assessment of level of innovative infrastructure in the enterprises under the czech condition. Based on the concept of Kiernan there was worked out a set of questions for research probe in selected large enterprises. The research brought both factual and methodological findings. In approximately 2-5% of large firms there can be assumed that currently they meet stringent standards, imposed on the level of business innovation infrastructure. Lower level of research and development activities appears to be a problem area. Ownership structure has sizeable influence.