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STRATEGIC ANALYSIS AS A TOOL FOR STRATEGIC DECISION-MAKING PROCESSES AT INDUSTRIAL COMPANIES

The aim of this article is to create a complex system for strategic analysis at industrial companies. The paper focuses on a demonstration model of strategic analysis with the use of Porter's five forces analysis. The authors describe the creation of a standardised visual form that could be used in industrial systems and this system testing on the data from companies engaged in mining and stone processing.

Keywords: strategic management; strategic analysis; support system for decision-making; industrial companies; Porter's analysis of competitive forces.

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СТРАТЕГІЧНИЙ АНАЛІЗ ЯК ІНСТРУМЕНТ У ПРИЙНЯТТІ СТРАТЕГІЧНИХ РІШЕНЬ НА ПРОМИСЛОВИХ ПІДПРИЄМСТВАХ

У статті продемонстровано створення комплексної системи для стратегічного аналізу на промислових підприємствах. Представлено демонстраційну модель такого стратегічного аналізу з використанням аналізу п'яти сил за Портером. Описано створення стандартизованої візуальної форми, яка може бути застосована у межах промислових систем. Форму протестовано на даних компанії із сектору добування та переробки каміння.

Ключові слова: стратегічний менеджмент; стратегічний аналіз; система підтримки прийняття рішень; промислові підприємства; аналіз п'яти сил за Портером.

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СТРАТЕГИЧЕСКИЙ АНАЛИЗ КАК ИНСТРУМЕНТ В ПРИНЯТИИ СТРАТЕГИЧЕСКИХ РЕШЕНИЙ НА ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЯХ

В статье продемонстрировано создание комплексной системы для стратегического анализа на промышленных предприятиях. Представлена демонстрационная модель такого стратегического анализа с использованием анализа пяти сил по Портеру. Описано создание стандартизированной визуальной формы, которая может быть применена в рамках промышленных систем. Форма протестирована на данных компании из сектора добычи и обработки камня.

Ключевые слова: стратегический менеджмент; стратегический анализ; система поддержки принятия решений; промышленные предприятия; анализ пяти сил по Портеру.

Introduction. Corporate success in today's turbulent business environment depends on timely anticipation of market opportunities, identifying threats and of course solving potential problems of strategic nature. General trends such as internationalization, globalization, intellectualization, informatisation and ecologization, can become opportunities in almost every business area, if management takes them into account while making strategic decisions. In case they are not being taken into consid-

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eration, these opportunities may become threats. It is therefore advisable to use appropriate research techniques TO get suitable data, which will be used to provide important information for management decisions (Kozel, Vilamova and Piecha, 2014).

Not only customers and consumers need to have satisfactory portfolio of information for their purchase decisions (Velcovska and Sadilek, 2014), also companies, industrial ones in particular, should above all evaluate information from their closest environment during strategic management. Closest environment includes specifically business environment such as customers' needs, behavior of competitors and suppliers, development of macroeconomic conditions (monetary and fiscal policies, legislation, tax system, possibilities of foreign investments, environmental requirements etc.). Matters related to internal corporate environment must not be neglected either.

Literature review. The issue of strategic management and planning is described in many professional sources. In our research we mostly rely on the "Key management models: the 60 models every manager needs to know". This book provides a list of available analyses (Assen, Berg, Pietersma and Have, 2009). Also it serves as a groundwork for individual analyses developed and subsequently transferred to software environment for the system which is being prepared to support strategic decision-making. Theoretical basis in the field of strategic thinking is provided in by "Strategic management" by V. Lednicky (2006) and "Ways to successful company: setting the goal and decision-making techniques" by G. Johnson (2000). The emphasis on innovation in strategic management and software support is put by (Hunka and Ministr, 2013). These authors define and analyse the behaviour of a proposed strategic system which is in accordance with the intentions of the authors of this article.

E. Heather et al. (2010) deal with new ways and business ethics in strategic management. However, the authors of the above mentioned article only theoretically state how to apply strategic management in today's world. Our team wants to build on these foundations, but not only on the theoretical level, would we also like to propose a set of methods applicable to strategic decision-making process. Also M. Dobbs (2014) chose similar topic, but only in its specific part. The aim of this author was to provide practitioners and students with a comprehensive set of templates to use for the 5 competitive forces of Porter's industry analysis. Our research team wants to, in a similar way, propose complex templates for many suitable analyses to be used by managers in their decision-making.

Current situation. The ideal model of strategic management at a company does not exist. Experts, however, agree that strategic management should be implemented in specific and logically linked steps. Strategic management should be comprehended as a never-ending process, as a sequence of repetitive and associated steps that begins with definition of company's mission, its targets and strategic analysis and ends with formation of possible solutions (strategies), selection and implementation of optimal strategies and control and last but not least correction of the course of their realization.

Today, top managers try to integrate the company as a whole through strategic management. They concentrate its forces, create, strengthen and look for system links between business activities and departments, in order to define and formulate strategies that lead to desirable and required goals (Sedlackova and Buchta, 2006).

The key aspect at all markets nowadays is customer satisfaction, which is more and more demanding. This fact brings the need to use the application of those mar-

keting tools which will change and adapt according to a target customer group or a market. The fundamental characteristic of the contemporary world's economic development is dynamic globalization (Vilamova et al., 2011).

There is no strategy that could be applied outside one specific corporation. One of the biggest mistakes, often made by companies, is that they are trying to use/apply some universal strategies. It must be a tailor-made strategy formed for a specific company. The basis is to rely on the synthesis of strategic analysis results. Early identification of positive and negative consequences of current development improves the quality of strategy creation and contributes to higher value of a company (Hrbac et al., 2005). The process of strategy creation is divided into partial sections to be consequently dealt with by their importance for strategy c. There are many models of strategic management systems (Lednicky, 2006; Sedlackova and Buchta, 2006). A very suitable model in particular for manufacturing and trading companies is pictured below in Figure 1.
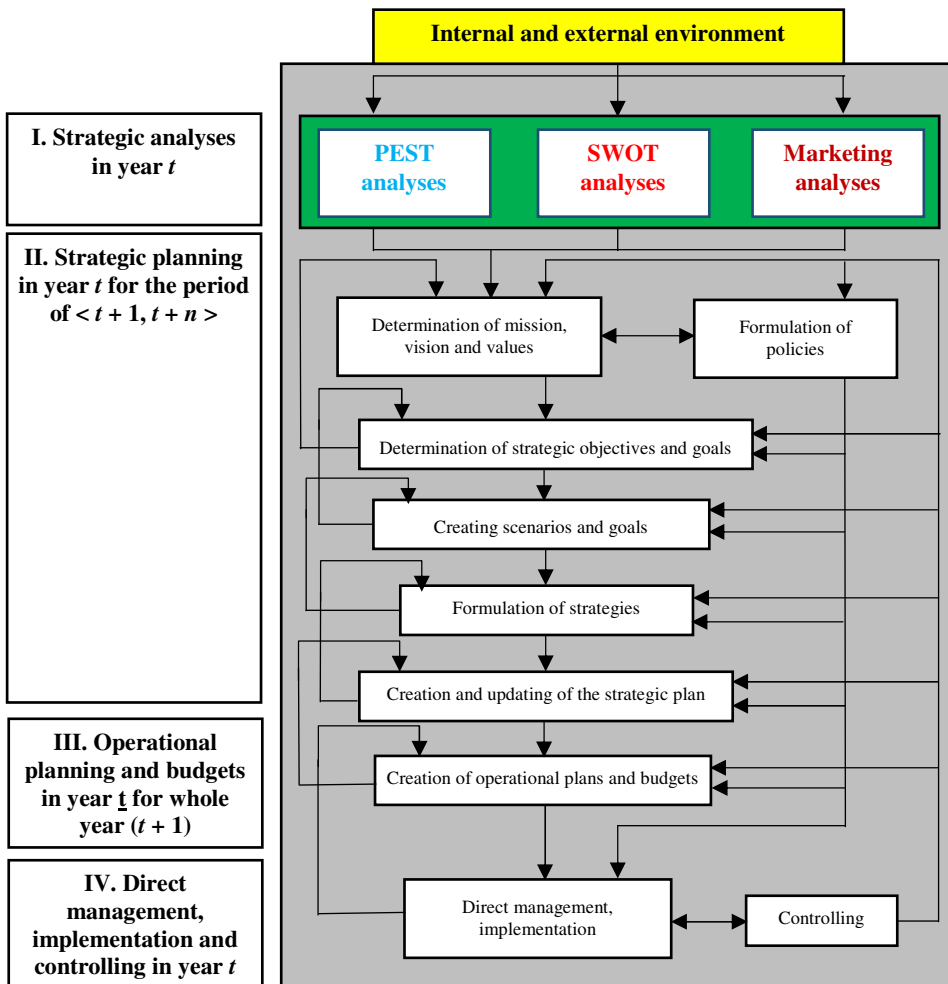

Figure 1. **Graphic model of strategic management system**
(Vlcek and Chuchro, 1999)

Area II − "Strategic planning" is currently secured by number of commercial systems, among which we would like to mention the system of business models EMA, used in the commercial sector as well as a teaching tool at the VSB TU Ostrava. Standard tools, which are either part of large accounting system, including the SW security, are used for areas III and IV or there are many other commercial products.

However, according to our previous knowledge, area I "Strategic analysis" does not have such comprehensive system, model or its software application. Another disadvantage is that many of these analyses have only verbal outputs and a very subjective form, which makes managerial evaluation and consequent conclusions rather biased.

Our research team is engaged in creating a comprehensive system for processing strategic analysis with graphically clear outputs that will help the user (manager) follow quickly. It is therefore necessary to collect all strategic analyses, arrange them in a suitable and systematic way and propose a user the environment that would be accessible for many companies. It is necessary to propose:

- Entry forms and screens.
- Algorithms for calculations for various methods and analysis.
- Numerical outputs processed into either tables or graphically processed maps, portfolios and graphs.

Theory.

Strategic management. In a contemporary sense strategic management is the process of creation and implementation of long-term development projects that are of significant importance for the given subject and their aim is to achieve convenient goals (Lednicky, 2006). Strategic management processes repeat themselves during certain, usually annual periods and depend on immediate and expected state of external and internal environment (Johnson, 2000), see Figure 2.

Strategic analysis. Significant part of strategic management and also the main focus for our research team is strategic analysis. The core of strategic planning is to build upon the actual market situation and analyse past, present and future situation of the company. It is a very complicated and complex process requiring systematic approach that allow researchers identify and analyse all the factors that influence the company. These strategic analyses include various analytic techniques that uncover relationship between company environment, industry, competitive forces, market, competitors, the source potential of a company etc. With regard to strategic analysis objectives it is possible to define two basic areas of its orientation, namely analysis focusing on macroenvironment, i.e. external environment of an enterprise, and analysis of microenvironment, i.e. the analysis of internal sources and abilities of a company (Figure 3). These environments cannot be seen as two separate groups; on the contrary, there is a large interconnection between them.

Competitive Analysis. Significant feature of the industry are competitive forces affecting the given sector. They represent an integral part of company's microenvironment analysis. To create a successful strategy it is important to analyse company in relation to its field of business. Major contribution to finding such solution was made by M. Porter in 1980, when he designed his 5 Competitive Forces Model. According to M. Porter the character and the level of competition within the sector also depends on factors that influence the negotiations of suppliers and customers,

threats from the side of competitors, risk of substitutes for products or services and degree of rivalry among firms in an industry. The aim of the model is to identify and understand the forces that influence the given sector. Company wishing to succeed should respond to these forces, cope with them and, if possible, use their influence in their favour (Jakubikova, 2008; Mallya, 2007).
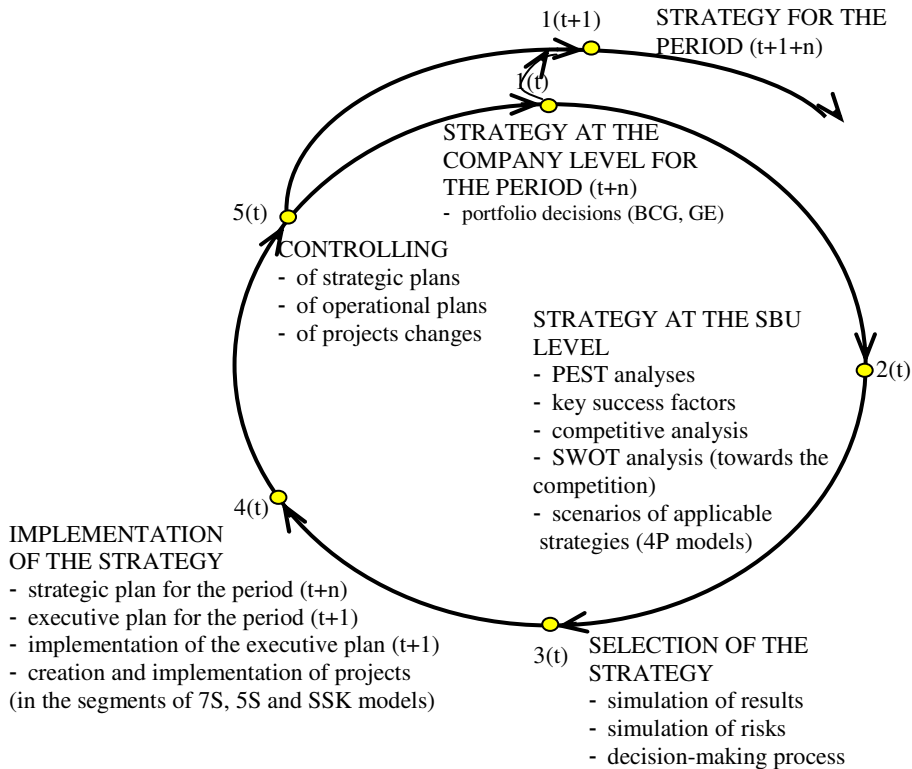

1(t+1)   STRATEGY FOR THE
          PERIOD (t+1+n)

1(t)

STRATEGY AT THE
COMPANY LEVEL FOR
THE PERIOD (t+n)
- portfolio decisions (BCG, GE)

5(t)

CONTROLLING
- of strategic plans
- of operational plans
- of projects changes

STRATEGY AT THE SBU
LEVEL
- PEST analyses
- key success factors
- competitive analysis
- SWOT analysis (towards the
competition)
- scenarios of applicable
  strategies (4P models)

2(t)

4(t)

IMPLEMENTATION
OF THE STRATEGY
- strategic plan for the period (t+n)
- executive plan for the period (t+1)
- implementation of the executive plan (t+1)
- creation and implementation of projects
(in the segments of 7S, 5S and SSK models)

3(t)   SELECTION OF THE
        STRATEGY
        - simulation of results
        - simulation of risks
        - decision-making process

Figure 2. **Strategic management cycle** (Sedlackova and Buchta, 2006)

External factors

Political, economic, socio-cultural, technological and other impacts of the macro-environment, pressures from globalization	Attractiveness of the industry, driving forces, key success factors, strategic competitive groups	Competitive forces, cost position of competitors and expected reactions of rivals

The strategic position of the company

Internal factors

Specific advantages, available resources, relative competitive strength, strengths and weaknesses, the balance of the portfolio
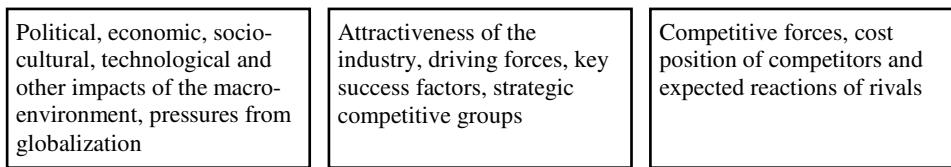
Figure 3. **Strategic analysis** (Sedlackova and Buchta, 2006)

Methodology and criteria.

Research aim. The aim of the undertaken research is to create user-friendly software environment that will offer processing of individual analyses, i.e. standardized inputs, built-in algorithms and computation methods and subsequent standardized outputs in the form of tables and graphical displays. This system will be tested on practical data of major companies in the field of mining and metallurgical industry. For this purpose, the system will be developed in combination with the Excel software and its programming background VISUAL BASIC.

Methodology analysis. To verify the method on real data a company from the field of stone mining and manufacturing was chosen. Secondary data was drawn from internal documentation of the company, such as previous market analyses and information of expert conclusions, company's managers.

The first analysis used in the forthcoming comprehensive system is Porter's analysis of competitive forces. This method is mainly used for situational analysis to determine competitive advantages, but the process and the results are entirely subjective, verbally interpreted an expert, applicable only to an immediate problem. Our research team is trying to standardize this analysis, so that managers who do not necessarily have to be also marketing experts and deal with Porter's analysis on daily basis, are able to create the competitive analysis themselves. The results of this analysis are consequently visually presented.

Traditionally, this analysis includes 5 forces, nevertheless, in some specific areas some of the forces may have very little influence, and it is therefore up to evaluators which groups to choose and analyse. Individual forces are estimated according to the following statements that can evaluate the strength of the influence each force has:

Competition within the industry. Intensity of competitive forces is a reflection of the energy that competitive companies place into their efforts to reach a better market position. For this area we chose the following statement: *Is there a large number of direct competitors in our industry? Is it a capital-intensive industry?*

Threat of substitutes. An important part is played by customers' needs. Crucial here are the following questions: *Is the price of a substitute lower than the price of our product/service? Does the substitute offer better accompanying services?*

Threat of new entrants. This subsection discusses the problem of new competitors within the industry. Seriousness of this threat depends mainly on entry barriers. Individual barriers are defined, for example, as follows: *Do you have any special technologies and know-how? Does your company have high demands regarding human resources?*

Analysis of bargaining power of suppliers. In this part we focus on what is the bargaining power of our suppliers. Can they influence the price of our product or its structure/ingredients? Evaluation could be for instance defined in the following way: *The supplier is hard to replace. There are not enough suppliers at the market.*

Analysis of bargaining power of buyers. The key aspect here is to find how do our customers influence our business; can they influence it by their behaviour? Some of the evaluating thesis here are e.g.: *Customers buy large volume of the product. There are many companies within this field.*

Figure 4 shows the basic user menu that demonstrates the evaluator how to proceed with each analysis. "Info" provides brief information on the chosen analysis.

"Back" refers to the "Porter's analysis menu". "Help" states individual steps that must be undertaken to compile the analysis properly. "Menu" refers to a relevant table in the analysis.
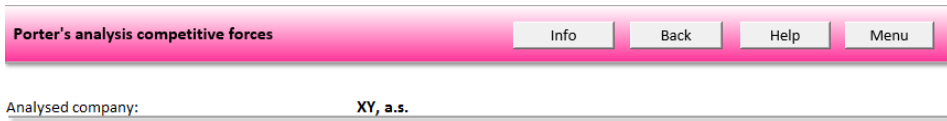

Figure 4. **User menu interface,** *authors'*

The users select which of the analyses will be carried out and after clicking on it they enter a page of specific competitive force, where for each force the main table is defined. The table includes a number of statements that reflect the strength of the relation the given factor has on the company. The evaluators express the degree of compliance with individual claims on the scale 0—10 (0 — absolutely disagree, 10 — agree completely), which also illustrates the strength of influence (0 — no influence, 10 — great influence). Users can also add their own needs to the statements, but it is necessary to create the question so if an evaluator agrees with the statement it means that the competitive group is a threat for the company being analysed.

The values indicating the score of influence of individual factors are calculated by the use of an arithmetic average and the influence coefficient is derived for every analysed group of factors. The arithmetic average is a sum of all values divided by their count. All the values in the calculations are equally important:

$$\overline{x} = \frac{1}{n}(x_1 + x_2 + ... + x_n) = \frac{1}{n}\sum_{i-1}^{n} x_i,$$ (1)

where x — value; n — number of values.

The influence coefficient ranging from 0 to 3.50 means that the negotiating strength of the group is small. Influence coefficient ranging from 3.51 to 7.00 means that the negotiating strength of the group is average. Influence coefficient ranging from 7.01 to 10.00 means negotiating strength of the group is great.

Paired Comparison Analysis of the criteria. Predefined statements, however, do not influence the company in the same way. Every industry is specific and therefore not all companies can be evaluated by the same criteria. Most methods of complex evaluation require a comprehensive assessment to determine the importance of individual evaluation criteria that state the importance of those criteria numerically respectively the importance of those criteria for an evaluator.

Weighted arithmetic mean is used in case each value has different importance — p, which must be assigned to each value. In case all the values are equal the weighted arithmetic mean is identical with the arithmetic mean:

$$\overline{x} = \frac{\sum_{i=1}^{n} x_i p_i}{\sum_{i=1}^{n} p_i} = \frac{x_1 p_1 + x_2 p_2 + ... + x_n p_n}{p_1 + p_2 + ... + p_n},$$ (2)

where x — value; p — weight.

The more important the evaluator considers each criterion, the more weight it gets. There are many methods to establish the criteria weight, they differ mostly by their complexity that derives from different algorithmic foundations of individual

method and therefore its comprehensibility for the evaluator. Furthermore, it varies in demand for information that the evaluator must have before stating the importance/weight of the criteria. To establish that weight, the method of paired comparison as well as the Fuller's method, were used.

The method of paired comparison is used to find preferential relations between pair of criteria. The task is to find the number of preferences for each criterion in relation to all other criteria of the given set. Such preference determination is done by a scheme in Figure 5. When evaluating this table, number of preferences for each criterion that equals the total number of preferences in a row and column of this criterion must be set. The result is expressed in %.

	Statement	1	2	3	4	5	6	7	8	9	10	Frequency	Weight, %
1	Supplier is hard to replace		1	1	1	1	1					5	33
2	There are only few suppliers			3	2	2	2					3	20
3	There is no substitute				3.4	3.5	3.6					2.5	17
4	Supplier is threatened by possible integration					4.5	4					2	13
5	Supplier's product is an important input for the business of a customer						5					2	13
6	The industry is not an important customer of the supplier											0.5	3
7	0,0											0	0
8	0,0											0	0
9	0,0											0	0
10	0,0											0	0
	Total											15	100

Figure 5. **Paired comparisons,** *authors'*

In our basic illustration of individual forces of Porter's analyses all the statements have equal importance. If the button "use pair comparison" is selected (Figure 6), it is possible to define the importance/weight of individual statements. This can significantly change the resulting influence of the given group.

Testing, outcomes and graphs. For the purposes of this article and for the reason of simpler demonstration of testing and graphical presentation of the main outcomes, only one of the forces from Porter's analysis was chosen, namely the analysis of bargaining power of suppliers. In this analysis, it is necessary to define the inputs for each supplier. As one can see in Figure 7, in total 5 suppliers were selected for pair comparison.

By clicking on the "menu" icon it is possible to open the pair comparison table and set the preferences for individual statements. The importance/weight of criteria are consequently shown in the "weight of statement" table. Then the evaluator replies to individual statements. The level of agreement is expressed on the scale of 0—10. Afterwards in the bottom line the average rating of individual suppliers is shown. In the last line "Total costs" the evaluator states the total cost of individual supplier.

#	Statement	Weight of statement, %	Weight of statement, %
		THE LARGEST SUPPLIERS	
	Use pair comparison	☑	
1	**Supplier is hard to replace**	33	17
2	**There are only few suppliers**	20	17
3	**There is no substitute.**	17	17
4	**Supplier is threating by possible integration**	13	17
5	**Supplier's product is an important input for the business of a customer**	13	17
6	**The industry is not an important customer of the supplier**	3	17
7		0	0
8		0	0
9		0	0
10		0	0
	Average rating	*100*	*100*

Figure 6. **Pair comparisons evaluation,** *authors'*

#	Statement	Weight of statement, %	1	2	3	4	5	Average
		THE LARGEST SUPPLIERS						
	Use pair comparison	*ano/ne*	α	β	γ	δ	Ω	Ø
1	**Supplier is hard to replace**	33	10	6	6	1	6	
2	**There are only few suppliers**	20	10	7	8	2	7	
3	**There is no substitute**	17	10	6	7	10	9	
4	**Supplier is threatened by possible integration**	13	6	5	7	1	1	
5	**Supplier's product is an important input for business of a customer**	13	10	5	10	10	9	
6	**The industry is not an important customer of the supplier**	3	10	4	10	10	3	
	Average rating	*100*	9.47	5.87	7.63	2.37	*6.33*	6
	Total costs	mln CZK	1,170	10,680	0,260	2,400	6,000	4,102

Figure 7. **Analysis of suppliers,** *authors'*

After entering these parameters, several possibilities of graphical presentation of outcomes are offered, e.g. the chart of average evaluation of the suppliers. This chart shows the level of influence each supplier has on the analysed company, i.e. to what extend they are able to influence business and how big these suppliers are in terms of annual costs. Such information is provided in bubbles the size of which is linked to the size of the abovementioned annual costs (Figure 8).

The results show that the suppliers who are in the upper third of the chart have greatest influence on the company in question. Suppliers in the middle of the chart
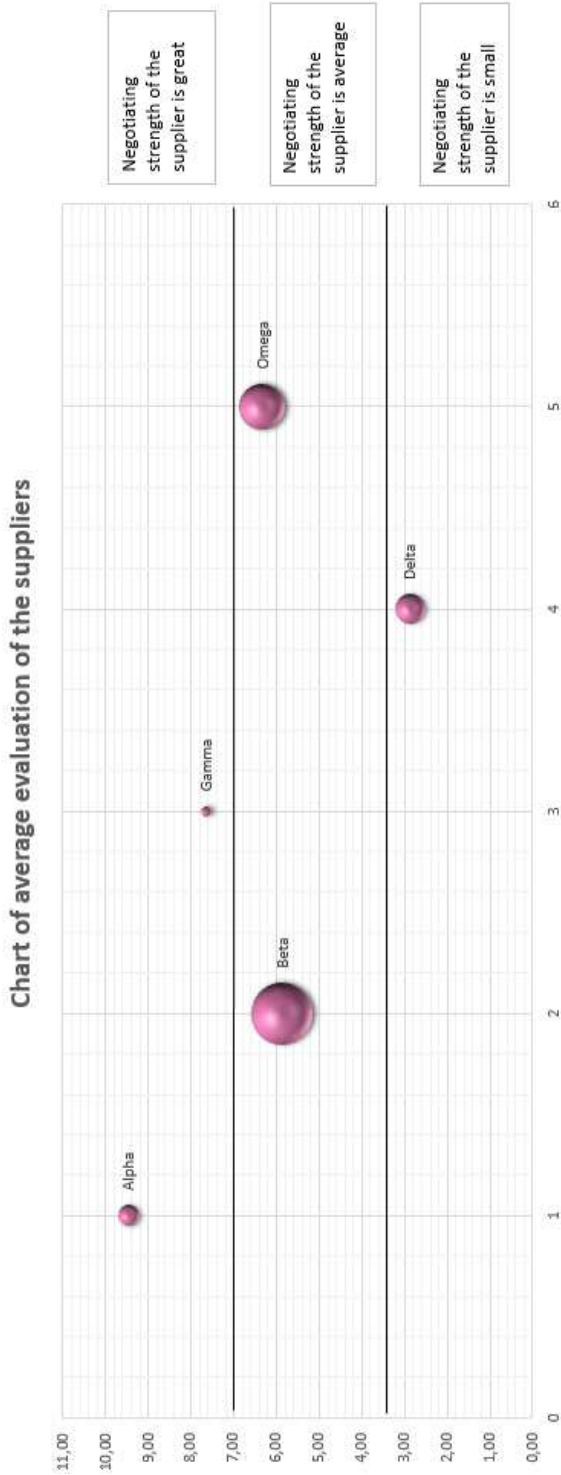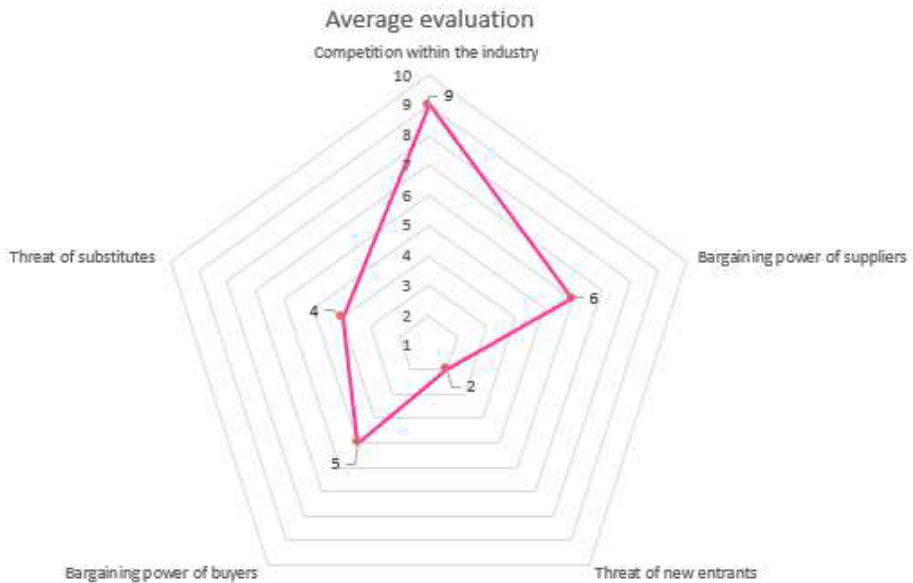
Chart of average evaluation of the suppliers

Negotiating strength of the supplier is great

Negotiating strength of the supplier is average

Negotiating strength of the supplier is small

Alpha

Beta

Gamma

Delta

Omega

Figure 8. **Average evaluation of suppliers,** *authors'*

(values from 3.51 to 7.00 on the Y axis) have only moderate influence on the company and suppliers shown in the lower third have very little effect on the company. Furthermore, the evaluator may e.g. choose to see the chart evaluating individual suppliers or portfolio chart.

To complete the whole Porter's analysis it is necessary to fill all other partial analyses. Every additional force of Porter's analysis is programmed in a way similar to the analysis of the bargaining power of suppliers with its specifics related to the given group. For instance, with the analysis of the bargaining power of buyers there is no need to name every single customer, they can be evaluated as a whole.

After identifying all relevant forces influencing the analysed company a final table is displayed together with a spider diagram of average competitive forces evaluation. Based on the abovementioned analysis it is possible to consequently summarize and create the model of competitive forces and state the level of rivalry of individual parts (Figure 9).

Competitive force	Average evaluation
Competition within the industry	9
Bargaining power of suppliers	6
Threat of new entrants	2
Bargaining power of buyers	5
Threat of substitutes	4

Figure 9. **Final evaluation,** *authors'*

In case of the analysed company, which is engaged in mining and processing of stone, it was shown that the greatest influence on achieving the current as well as future goals with regards to competition is initiated by two forces (areas). Namely, it was the competition within the industry and the bargaining power of suppliers (which was also used to demonstrate the system functionality in this article). Both the table

and the chart clearly show that the indicators of the average evaluation reach the highest values.

Conclusion. Top management of every company is used to handle quite aggregated and clearly interpreted visual information. Quite frankly, top managers do not have time to go through extensive texts essays and they need clear, concise and preferably brief visual information. Therefore, the intention of our team of authors was to prepare such outcomes for strategic system development.

This article there was a small demonstration of how the future complex system could work as well as a proposal on how it could look. Given the extent of the article, it is not possible to show all the specifics of the programmed analysis. This model will be gradually developed and elaborated by further analysis and tested on major industrial companies, so that the analyses are easy to fill in and display real data about the company.

Resources:

Assen, M., Berg, G., Pietersma, P., Have, S. (2009). Key management models: the 60 models every manager needs to know. 2nd ed. New York: Financial Times/Prentice Hall. 249 p.

Dobbs, E.M. (2014). Guidelines for applying Porter's five forces framework: a set of industry analysis templates. Competitiveness Review, 24(1): 32–45.

Heather, E., Stephen, B., Jared, H., Robert, P. (2010). New Directions in Strategic Management and Business Ethics. Business Ethics Quarterly, 3: 401–425.

Hrbac, L., Friedrich, V., Arencibia, O. (2005). The Use of Fuzzy Modelling for Economical Diagnostics of Organizations (Firms). In: Aplimat 2005 – 4th International Conference, Pt I (pp. 501–511). Bratislava, Slovakia: Slovak University of Technology.

Hunka, F., Ministr, J. (2013). Innovation in Use Case Deriving. In: Proceedings of 21st Interdisciplinary Information Management Talks (IDIMT), September 11–13, 2013 (p. 105–115). Prag, Czech Republic. Linz: Universitatsverlag Rudolf Trauner.

Jakubikova, D. (2013). Strategicky marketing: strategie a trendy. Praha: Grada. 269 s.

Johnson, G. (2000). Cesty k uspesnemu podniku: stanoveni cile a techniky rozhodovani. Praha: Computer Press. 803 s.

Kozel, R., Vilamova, S., Piecha, M. (2014). The Use of Cluster Analysis in B2B Marketing Research. Kosice: TU v Kosiciach. 86 p.

Lednicky, V. (2006). Strategicke rizeni. Ostrava: Repronis. 153 s.

Mallya, T. (2007). Zaklady strategickeho rizeni a rozhodovani. Praha: Grada. 246 s.

Sedlackova, H., Buchta, K. (2006). Strategicka analyza. 2 preprac. a dopl. vyd. Praha: C. H. Beck. 121 s.

Velcovska, S., Sadilek, T. (2014). The system of the geographical indication – important component of the politics of the consumers' protection in European Union. Amfiteatru Economic Journal, XVI(35): 228–242.

Vilamova, S., Janovska, K., Voznakova, I., Kozel, R. (2011). Selected Specific Aspects of Marketing Analyses and Management in the Conditions of Metallurgy Firms. In: METAL 2011: 20th Anniversary International Conference on Metallurgy and Materials: May 18–20 (pp. 1279–1285). Brno. Ostrava: TANGER.

Vlcek, D., Chuchro, J. (1999). Modely a modelovani. Ostrava: VSB–TU Ostrava. 208 s.

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