CREATING OF THE SCENARIOS OF THE COMPANY DEVELOPMENT USING MCDM METHODS IN PRACTICE

Iveta Dočkalíková − Jana Klozíková

Abstract

Every company that wants to succeed in the long term market environment should have a strategy that it will follow. Within the strategy of the firm, a company must make a decision which direction it will take. Bad decisions can have fatal consequences, while the correct strategic decisions can ensure the market advantage for the enterprise. Applying the conception of scenario creation becomes a starting point. Scenarios are defined as descriptions of possible states of the future development of the company surroundings. Concept of scenarios is then based on the creation of several scenarios of busines enviroment development and on the preparing of various options strategies for each of them. During the implementation of the strategy it is possible to flexibly switch between pre-prepared versions of the strategy depending on an actual development in the business environment. The conception of scenario creation is the way that can help to effectively protect businesses against unexpected changes of the business environment. This paper aims to identify individual areas of macro and competitive surroundings using the methods of multi-criteria decision making and also to select the best scenario for company X, including graphical bending details.

Key words: strategy, MCDM, AHP, Scenarios

JEL Code: C02, M21

Introduction (Times New Roman, 14 pt., bold)

In current highly dynamic and competition world, the subjects of private as well as public organizations must deal with many risks threatening optimal operation and effective functioning of the company.

The purpose of strategy is to create a good fit between the characteristics of the organisation for which the strategy is designed and the business environment. The strategist needs to consider both parts of the equation. This task needs to be carried out in a situation which is uncertain and ambiguious. The higher the uncertainty and the more dynamic the situation, the more problematic is the idea of 'the best strategy'. What seems best today may be far from

ideal tomorrow. The key to success becomes the ongoing process of strategic evaluation and action.

Unstable environment itself makes it very difficult for the managers to recognize strategic problems, which however must be solved on a daily bases. In the multilateral amount of information which overload the managers, the problem's solving is more and more difficult. Traditional tools for the decision making support are becoming only a theoretical fiction, where they do not fully reflect current conditions at which the strategic decisions are made. The scenarios present a set of possible reality future. By scenarios it is possible to verify the possibilities which could potentially happen. The verification of these facts helps to prepare for future development. Scenarios creation assumes the identification of main requirements and forces which influence the company's ability to fulfill its target (Charvát, 2006). Main aim of this paper is the determination of important parts of macro-environment by using MADM methods and selection of the most appropriate scenario for company X, including the graphical representation.

1 Multiple criteria decision making methods

The multicriteria evaluation of variants method is a discipline, which is dealing with the research of decision problems, in which final number of variants is evaluated based on several criteria. In the multicriteria evaluation of variants models is given final group *m* variants, which are evaluated based on *n* criteria. Such decision situation can be described with criteria matrix, which follows, Fiala, Jablonský, Maňas (1994).

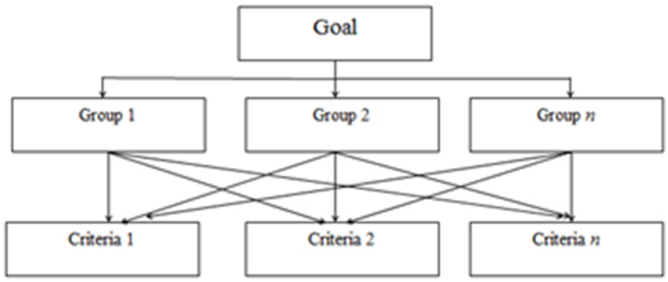
$$\begin{array}{c} \\ K_1 \\ K_2 \\ \vdots \\ K_m \end{array} \begin{array}{c} \begin{array}{cccc} A_1 & A_2 & \dots & A_n \end{array} \\ \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix} \end{array}, \tag{1}$$

1.1 Multi-level decomposition methods AHP

The Analytic Hierarchy Process (AHP) is a multi-criteria decision-making approach and was introduced by Saaty (1977 and 1994). The AHP has attracted the interest of many researchers

mainly due to the nice mathematical properties of the method and the fact that the required input data are rather easy to obtain. The AHP is a decision support tool which can be used to solve complex decision problems. It uses a multi-level hierarchical structure of objectives, criteria, subcriteria, and alternatives. The pertinent data are derived by using a set of pairwise comparisons. These comparisons are used to obtain the weights of importance of the decision criteria, and the relative performance measures of the alternatives in terms of each individual decision criterion.

Fig. 1: General AHP structure



Source: Saaty, 1980

Many various methods exist for weight determination; the simplest ones are linear methods, in which are subjectively determined non-normalized weights of individual criteria in a priory agreed ranking scale. Second group includes so called non-linear methods, e.g. pairwise comparison, where Fuller triangle method or more complex Saaty method belongs. In this paper the aforementioned Saaty's method is used. The criteria weights can be determined very easily by so called approximation methods, which are practically well solvable by determination of normalized weights w_i by the utilization of geometrical mean of lines

$$v_i = \frac{R_i}{\sum_{i=1}^{m} R_i} = \frac{\left[\prod_{j=1}^{m} s_{ij}\right]^{1/m}}{\left[\sum_{i=1}^{m}\prod_{j=1}^{m} s_{ij}\right]^{1/m}}, i = 1, 2, ..., m. \quad (2)$$

More information pertaining to the computation can be found in (Dočkalíková, Kashi 2013).

1.2 PESTEL analysis

Strategic analysis, is the first of the basic stages of strategic management, and involves the analysis of current factors relevant to the environmental within which the company carries out its operations (Ülgen & Mirze, 2007). PESTEL analysis has different definitions within the literature, such as PEST (Dare, 2006) and STEPE (Richardson, 2006). The original form of PESTEL was first conceived by Aguilar as ETPS (economic, technical, political, and social). This was subsequently reorganized as STEP for the Arnold Brown Institute of Life Insurance for use in strategic evaluation of trends. In was later modified to address macro analysis of the external environment or scanning for environmental change, and was defined as STEPE. In the 1980s, the legal dimension was added to this approach (Richardson, 2006). Apart from a technique for strategic analysis, PESTEL analysis began to be used in different fields (Katko, 2006; Richardson, 2006; Shilei & Yong, 2009).

1.3 Scenarios

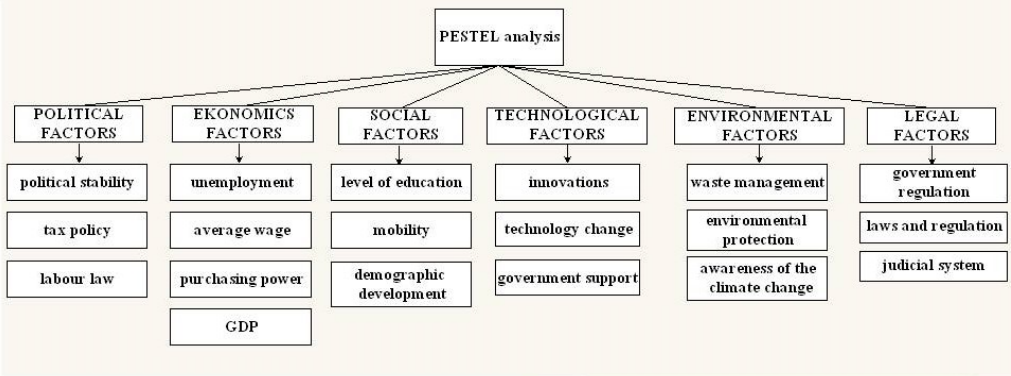
Scenarios, as a prime technique of future studies, have long been used by government planners, corporate managers and military analysts as powerful tools to aid in decision making in the face of uncertainty. The idea behind them is to establish thinking about possible futures which can minimise surprises and broaden the span of managers' thinking about different possibilities. Scenarios are a powerful tool in the strategist's armory. They are particularly useful in developing strategies to navigate the kinds of extreme events we have recently seen in the world economy. Scenarios enable the strategist to steer a course between the false certainty of a single forecast and the confused paralysis that often strike in troubled times (Heijden, 2006).

2 Process of the scenarios of the company

1. *Determinating factors of individual Macro perspective*

Macro perspective analysis enables the company's management to find especially the relations and connections among individual factors and also to realize and determine the opportunities and threats on which the company should concentrate on.

Fig. 2: PESTEL analysis



Source: Own elaboration

In the table below, the evaluator's preferences are calculated, the evaluators are from the company providing services for citizens. In tab. 1 we can see, that economic factors have the highest importance through all other factors with almost 45 %. This fact is given since the purchasing power plays the highest attribute in this company. While environmental and political factors have a very low representation. This fact is given by the impossibility to influence political stability of the state and other partial factors. Within the political factors the biggest role is played by tax policy with almost 39 %, while within the social factors the importance is given to the mobility a that is with almost 60 %. Any change in social environment can have an impact on the change of demand on company's product and availability and willingnes of individuals to work. Within the technological factors the attention is devoted to government support that is due to the deregulation of mobile operators in the Czech Republic. Based on acquired data the possible threat for the company is especially a new operator on the market.

Tab. 1: Company providing service - local and global weights PESTEL factors

Criteria group	Weights of criteria's groups	Criteria	Local weights	Global weights
Political factors	0,0577	Political stability	0,3301	0,0191
		Tax policy	0,3914	0,0226
		Labor law	0,2784	0,0161
Economics factors	0,4471	Unemployment	0,2550	0,1140
		Average wage	0,1206	0,0539
		GDP	0,0850	0,0380
		Purchasing power	0,5393	0,2411
Social factors	0,1136	Level of education	0,1075	0,0122
		Mobility	0,6069	0,0689
		Demographic development	0,2856	0,0324

Technological factors	0,2272	Innovations	0,2583	0,0587
		Technology change	0,1047	0,0238
		Government support	0,6370	0,1447
Environmental factors	0,0408	Waste management	0,6046	0,0247
		Environmental protection	0,2906	0,0119
		Awareness of the climate change	0,1048	0,0043
Legal factors	0,1136	Government regulation	0,4742	0,0539
		Laws and regulations	0,3764	0,0428
		Judicial system	0,1494	0,0170

Source: Own elaboration

Company X has executed the analysis of its macro-environment with expert's evaluators and partial factors were determined. Creation of possible scenarios of future development follows. For this purpose group of evaluators is also needed; they have selected 2 important factors from each area of macro-environment, see Tab.1 and they evaluated possible trends of individual factor's development.

2. *Evaluation of three basic development trends of selected factors, i.e. growth, stabilization and decrease, from the viewpoint of:*
    - impact on company – point scale within the range of -5 to +5 is used, where -5 represents highly negative impact and +5 highly positive impact,
    - probability occurrence within the range 0 to 1, where 1 means that the factor will occur with 100% certainty.

Tab. 2: Input data for creation of environment's development scenarios

Macro perspective	Factors with fundamental impact on company	Development trend	Impact size	Occurrence probability
Political factors	Political stability	growth	2	0,4
		stability	2	0,4
		decrease	-3	0,2
	Tax policy	growth	-2	0,1
		stability	2	0,3
		decrease	2	0,1
Economics	Unemployment	growth	-4	0,6
		stability	3	0,2
		decrease	3	0,1
	Purchasing power	growth	5	0,4
		stability	3	0,2
		decrease	-5	0,2
Social factors	Level of education	growth	4	0,5
		stability	2	0,4

		decrease	-1	0,2
	Demographic development	growth	3	0,3
		stability	2	0,3
		decrease	1	0,2
Technological factors	Innovations	growth	3	0,7
		stability	2	0,2
		decrease	-5	0,1
	Government support	growth	3	0,3
		stability	2	0,3
		decrease	1	0,1
Environmental factors	Waste management	growth	4	0,6
		stability	2	0,2
		decrease	-4	0,2
	Environmental protection	growth	3	0,3
		stability	2	0,3
		decrease	-3	0,1
Legal factors	Government regulation	growth	4	0,3
		stability	4	0,6
		decrease	-4	0,2
	Laws and regulations	growth	4	0,4
		stability	3	0,6
		decrease	-4	0,2

Source: Own elaboration

3. *Creation of four scenarios of company's environment development:*
    - optimistic – is created by the selection of trends with the highest positive impact on the company,
    - pessimistic – is created by trends with the highest negative impact on the company,
    - realistic – consists of trends which have the highest probability of occurrence,
    - surprise – contains trends with the smallest possibility of occurrence.

4. *Calculation of average impact of environment's individual areas as a arithmetic mean of the factor's impact from given area.*

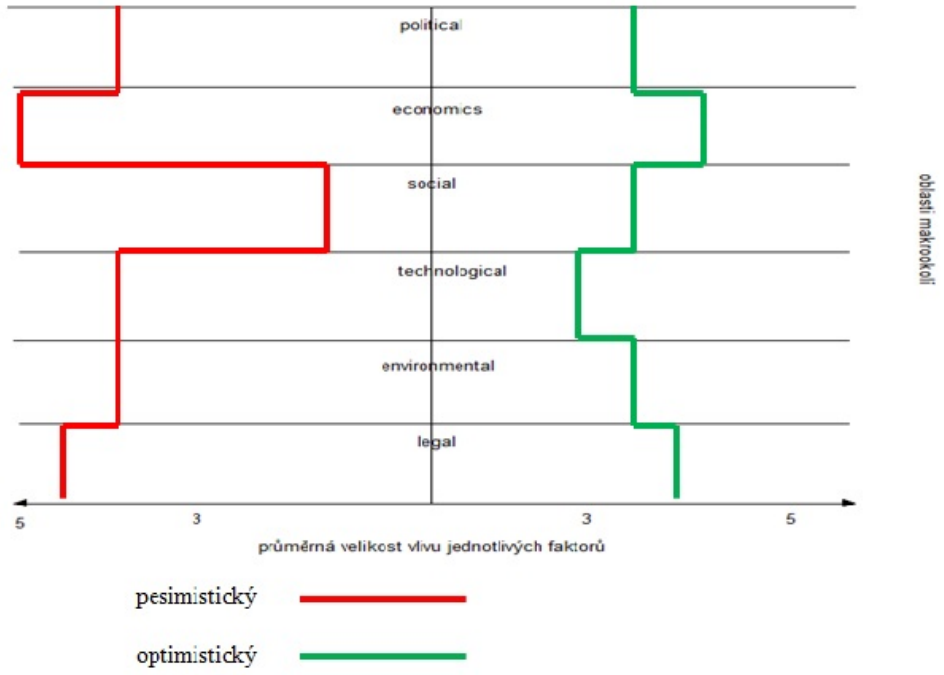
Based on mentioned data the scenarios of future development of company's environment can be created; they are shown in Tab. 3.

Tab. 3: Scenarios of future impact of environment

		scenarios							
		optimistic		*pessimistic*		*realistic*		*surprise*	
Macro perspective	**Factors**	In words	point	In words	point	In words	point	In words	point
Political factors	Political stability	stability	4	decrease	-5	stability	4	decrease	-5
	Tax policy	stabilita	3	growth	-2	growth	-2	decrease	2
Average size of impact			**3,5**		**-3,5**		**1**		**-1,5**
Economics	Unemployment	pokles	4	growth	-5	growth	-5	decrease	4
	Purchasing power	growth	5	decrease	-5	growth	3	growth	5
Average size of impact			**4,5**		**-5**		**-1**		**4,5**
Social factors	Level of education	growth	4	decrease	-1	growth	4	decrease	-1
	Demographic development	growth	3	decrease	-2	growth	3	decrease	-2
Average size of impact			**3,5**		**-1,5**		**3,5**		**-1,5**
Technological factors	Innovations	growth	3	decrease	-5	growth	3	decrease	-5
	Government support	growth	3	decrease	-2	stabilita	2	decrease	-2
Average size of impact			**3**		**-3,5**		**2,5**		**-3,5**
Environmental factors	Waste management	growth	4	decrease	-4	growth	4	decrease	-4
	Environmental protection	growth	3	decrease	-3	stability	2	decrease	-3
Average size of impact			**3,5**		**-3,5**		**3**		**-3,5**
Legal factors	Government regulation	growth	4	decrease	-4	stability	3	decrease	-4
	Laws and regulations	growth	4	decrease	-4	stability	3	decrease	-4
Average size of impact			**4**		**-4**		**3**		**-4**

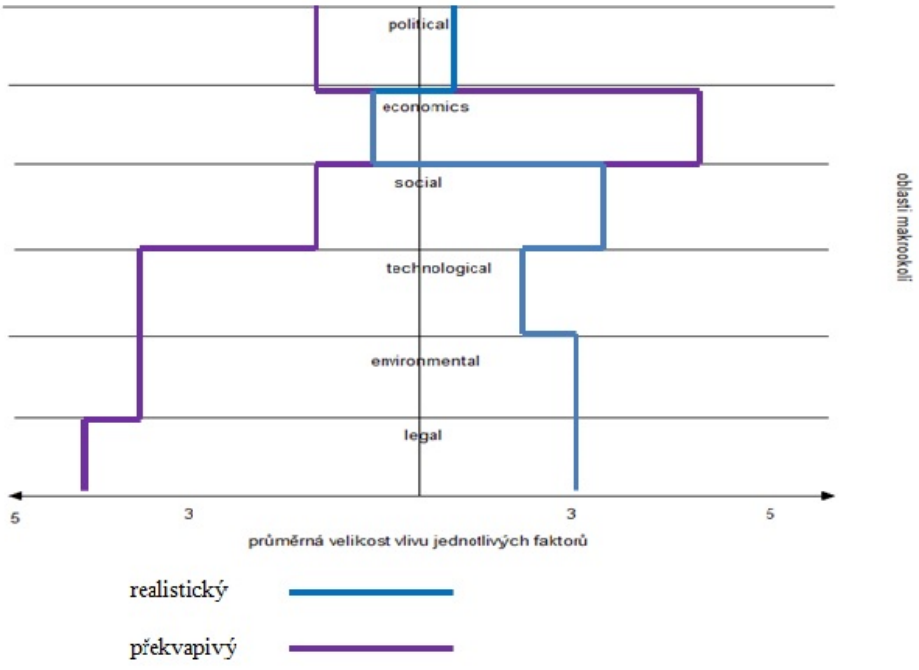
Source: Own elaboration

Fig. 3: Impact of macro-environment on the company in case of optimistic and pessimistic scenario



Source: Own elaboration

Fig. 4: Impact of macro-environment on the company in case of optimistic and surprising scenario



Source: Own elaboration

Conclusion

The span between optimistic and pessimistic scenario point out the variability (turbulence) or stability in a given area depending on the environment development. The more the mentioned span is larger the higher is the variability of given area and the more attention should be devoted to the strategy creation. On the contrary, very narrow span means, that any change of environment the given area will have a relatively same impact on the company. From this view point it can be stated that in the example shown the critical area is the economical one. Unfortunately also other areas present high level of variability in connection to the company's environment development.

In the optimistic and realistic scenario the areas with a positive impact on company, i.e. opportunities predominate. Therefore, prepared variants of strategy should be aimed at their utilization. By contrast in pessimistic and surprise scenarios the threats predominated and relevant variants of strategy should include the countermeasures for their elimination.

Acknowledgment

This paper is financed by Student Grant Competition of the Faculty of Economics, VŠB-Technical University of Ostrava; project's registration number is SP2015/93. All support is greatly acknowledged.

References

1. DARE, C. (2006). The UK tour-operating industry: A competitive analysis. *Journal of Vacation Marketing, 6*(4), 357-367.

2. DOČKALÍKOVÁ, Iveta a Kateřina KASHI. Selection of Employees: Multiple Attribute Decision Making Methods in Personnel Management. In: *Proceedings of the 9th European Conference on Management Leadership and Governance*. Maria Th. Semmelrock-Picej a Ales Novak. 1. vyd. Reading: Academic Conferences and Publishing International Limited, 2013. s. 367-375. ISBN 978-1-909507-86-9.

3. FIALA, Petr, JABLONSKÝ, Josef a Miroslav MAŇAS. (1994). *Vícekriteriální rozhodování*. Praha: VŠE Praha.

4. HEIJDEN, Kees van der. *Scénáře: umění strategické konverzace = Scenarios : the art of strategic conversation*. Vyd. 1. české. Praha: ASPI, 2006, 359 s. ISBN 80-735-7209-5.

5. CHARVÁT, Jaroslav. Firemní strategie pro praxi. 1. vydání, Praha: Grada Publishing,a.s., 2006, 204 s., ISBN 80-247-1389-6.

6. KATKO, T. S. (2006). Road Safety Fatalities, Management, and Policy in Finland, 1970-2003. *Public Works Management & Policy, 11*(2), 126-138. http://dx.doi.org/10.1177/1087724X06294066

7. RICHARDSON, Jr. J. V. (2006). The library and information economy in Turkmenistan. *IFLA Journal, 32*(2), 131-139. http://dx.doi.org/10.1177/0340035206066410

8. SAATY, Thomas L. *The analytic hierarchy process: planning, priority setting, resource allocation*. 1. vyd. London: McGraw-Hill International Book Co., 1980, 287 s. ISBN 9780070543713.

9. SHILEI, L., & YONG, W. (2009). Target-oriented obstacle analysis by PESTEL modeling of energy efficiency retrofit for existing residential buildings in China's northern heating region. *Energy Policy, 37*, 2098-2101. http://dx.doi.org/10.1016/j.enpol.2008.11.039

10. Ülgen, H., & Mirze, S. K. (2007). İşletmelerde stratejik yönetim. Arıkan Yayınları, İstanbul.

Contact

Iveta Dočkalíková

VŠB-Technical University of Ostrava

Sokolská 33, 701 21 Ostrava

iveta.dockalikova@vsb.cz

Jana Klozíková

VŠB-Technical University of Ostrava

Sokolská 33, 701 21 Ostrava

jana.klozikova@vsb.cz