

Prochazkova, Petra Tausl; Krechovska, Michaela; Lukas, Ladislav

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**EFFECTIVENESS OF ENTREPRENEURSHIP POLICIES:
SOME EVALUATION RESEARCH PERSPECTIVES**

Petra Tausl Prochazkova^{1*}, Michaela Krechovska² and Ladislav Lukas³
^{1) 2) 3)} *University of West Bohemia, Pilsen, Czech Republic*

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Abstract

Entrepreneurship has recently become a tremendous topic of discussion. Although at the centre of interest of every public policy there are obviously efforts to foster entrepreneurial ventures, there is still a gap in a possible methodology of measuring and monitoring the effectiveness of entrepreneurship support policies. The aim of this paper is to propose a possible methodology of the measurement such effectiveness of entrepreneurship policies. First, there are presented the most relevant facts on entrepreneurship, as well as entrepreneurship support policy as a prerequisite for entrepreneurship development. Suitable methods of measuring of the impact of entrepreneurship policies are discussed, which results in a proposal of own research methodology based upon AHP (Analytic Hierarchy Process). The research methodology is based on several indicators that are considered to be the most relevant elements to entrepreneurship outcomes in today's economy. Indicators of a micro economic character and macro-economic character are chosen. The proposed methodology of evaluation of effectiveness of entrepreneurship policies is verified by means of a case study.

Keywords: entrepreneurship policy, effectiveness, indicators, AHP (Analytic Hierarchy Process), preference weights

JEL Classification: L26, M21, H50

Introduction

There is no doubt that entrepreneurship is a key factor in the well-being of society, economic growth and competitiveness. Entrepreneurship in general is a highly-developed system influenced by business environment conditions and the activities of various subjects such as entrepreneurs themselves, policy makers, public and non-public institution representatives and society (Amorós and Bosma, 2014). As well as the customer becoming

* Corresponding author, **Petra Tausl Prochazkova** – pprochaz@kpm.zcu.cz

more demanding and selective, the business environment has also changed dynamically during the past several years. Therefore, in today's economy several forms of entrepreneurship have spread. In general, there are no borders for the business environment. Thus, globalization is the conventional term for the current era and conditions of the business environment (Kubickova and Prochazkova, 2014; Onetti et al., 2012). Because entrepreneurial activities are the focus of each economy, various support policies have been provided in order to foster such ventures (Szabo, Soltes and Herman, 2013). The evolution of new entrepreneurial activities means that many new businesses play role in the diffusion of employment, innovation, productivity etc. (Fritsch, 2013). As there are many obstacles entrepreneurs have to face, suitable help should be more than welcome. However, there is often a gap between the response used to influence growth, and the effectiveness of such stimulation. Naturally, a simple question comes to mind: *How do we measure the effectiveness of policies aiming to encourage and support entrepreneurship development?* There is definitely a relationship between entrepreneurship performance, entrepreneurship policies and business environment.

1. Entrepreneurship: an issue of the highest awareness

Entrepreneurship has attracted greater attention. It is the heart of sustainable, organic growth for most developed, as well as transitioning and developing economies (Carayannis and Maximilian von Zedtwitz, 2005). For example, Kiesner (2010) says that entrepreneurship and entrepreneurs are a path out of the world's economic troubles and chaos. Many experts (Audretsch et al., 2007; Moore, 1986; Shane and Sankaran, 2000) have also tried to define entrepreneurship. In general, entrepreneurship scholars put a great degree of attention in developing and describing alternative perspectives of entrepreneurship (Wiklund and Shepherd, 2005; Dess and Lumpkin, 2005; Cuervo, Ribeiro and Roig, 2007; Tausl Prochazkova, 2012). These typologies typically demonstrate an entrepreneurial process as a live, organic system that confronts many needs and includes many principles. The differences in entrepreneurship characteristics draw attention to diversity in social, individual and organizational factors (Lumpkin and Dess, 1996).

Furthermore, Cunningham and Lischeron (1991) describe entrepreneurship based on several schools of entrepreneurship. Each of the forms has been more developed and leads to several views on entrepreneurship and entrepreneurs globally. First, a classic school can be mentioned, where innovation lies in the centre of the aims of entrepreneurship (Peterson, 1985). Another approach considers entrepreneurship mainly from a management perspective, and that entrepreneurship organizes economic ventures with respect to risk and the ability to manage it (Bird, 1988). In today's changing business environment, the main interests include areas such as corporate entrepreneurship (intrapreneurship) or social entrepreneurship. Social entrepreneurship considers both "social" and "entrepreneurship" elements (Peredo and McLean, 2006). Whereby, the social capital accessed by individuals has been found as very important by this case (Audretsch and Aldridge, 2012). Pomerantz (2003) describes this type of entrepreneurship as it involves taking a business-like, innovative approach to the mission of delivering community services. On the other hand, corporate entrepreneurship refers to a process whereby firms engage in diversification through internal development (Burgelman, 1983). Entrepreneurship within existing organizations is viewed as beneficial for the revitalization and performance of corporations,

as well as for small and medium-sized enterprises and entrepreneurship in general (Antoncić and Hisrich, 2001).

2. Entrepreneurship support policies in today’s business environment

The business environment can be described as a living complex of factors, individuals and processes which form entrepreneurship conditions. New trends and concepts are being developed that enterprises should react to if they want to be successful. For example, the emphasis on setting the right business model for established new venture, or the emergence of a new technology or method in the market has been made important for entrepreneurial success (Cavalcante, 2014; Kantnerová, 2011). Entrepreneurs and policy makers have to adapt to this changing environment. Perhaps the most comprehensive structure and changes of business environment have been proposed by the Global Entrepreneurship Monitor (Amorós and Bosma, 2014). Recently, soft factors – such as environment-oriented factors, regionalism and corporate social responsibility – have gained in importance (Wagner and Sternberg, 2004; Víturka et al., 2013; Januska et al., 2010). Also, the entrepreneur and environment is changing, and therefore the entrepreneurial orientation of support policies must be formed. The study of entrepreneurship and its support has been built on a variety of determinants such as economics, sociology, psychology, and so forth (Grilo and Irigoyen, 2006). The methods of entrepreneurship support vary and it is in no way a simple matter of financial support. Table no. 1 demonstrates the basic forms of business support.

Table no. 1: Basic forms of business support

Direct tools	Indirecttools
Returnable financial aid/support	Information services
Grants/subsidies	Consulting services
Financial contribution	Training education for business activity
Guarantees	Infrastructure, incubators, science-technology parks, clusters
Credit/loan with a lowered interest rate	Simplification of administration
	Better legal environment

Some experts doubt the appropriateness of entrepreneurship support. Acs and Audretsch (2003) mention the necessity of a vital entrepreneurial society and agree on the need for a suitable network of supporting instruments. Boter and Lundström (2005) also note that there are individuals behind each business and it is they who create the business. From this point of view, it is obvious that access to information needs support in terms of proper personal motivation, making use of business opportunities and information about proper use of supporting instruments leading to the acquisition of necessary business knowledge. Kevin Mole’s (2004) approach supports the creation of support channels as well, which emphasize the necessity to focus on every businessperson in order to understand their trade and market analysis. This can be done ideally through efficiently made programs devoted to providing information and financial support. Storey (1994) has identified two fundamental and rational reasons for supportive business policies. The first one rests upon the fact that businesspeople create new jobs and innovations and it is convenient to support them in their growth and the growth of wealth connected with it. The other reason is based on market failures, which disturb ideal market conditions and may lead to inefficient business. If there were no market failures, perfect market conditions would lead to efficient business, innovation, employment and production. Parker (2009) gives several examples that may be the reasons for business support services. The first one is imperfect information. This

argument is confirmed by Chrisman et al. (2005), who mentions the so-called “knowledge deficit”. The second reason has to do with businesspeople entering a new market or introducing a new product. The first one to enter the market, the so-called “first mover”, bears the costs connected with the “discovery”, yet thanks to the absence of a suitable patent for example, he/she has to share his/her advantage with others entering the market, (the so-called “free riders” – often stronger companies). This reduces the benefits of the first mover and such businesspeople may not see added value in the development of innovations. That is why it is advisable to motivate such businesspeople with a suitable support instrument so that the innovating author’s costs can be lowered. On the other hand, there are doubts on the part of scientists, as well as many businesspeople, as to whether the state should systematically support enterprise. The business support model may inadvertently bring about the side effect of diversion from the original business plan to pure search for suitable funding and creation of space for more bureaucracy and corruption (Sobel, 2008). Generally speaking, support of business can bring along the risk of government failure in the form of misuse of such help by its beneficiaries for their own enrichment. Too much focus of support programs on innovation may lead to “over-innovation”, which may result in a great amount of similar and unnecessary products.

3. How does it work together? A topic of research interest

Until now, studies have not sufficiently accounted for the complex problem of measuring the impact of support policies on entrepreneurship outcomes. There are many studies focusing on the relationship between entrepreneurship and economic growth, either on a regional level or globally (Minnitia and Lévesque, 2010; Wennekers and Thurik, 1999). For example, Wennekers and Thurik (1999) carried out significant work in the construction of a framework linking entrepreneurship and economic growth. Also, some experts have been focused on the topic of measuring entrepreneurship in research (Murphy, Trailer and Hill, 1996; Audretsch and Keilbach, 2004).

Another group of studies has also focused in general on measuring entrepreneurship performance. The most well-known include the Global Entrepreneurship Monitor (Amorós and Bosma, 2014) study, the OECD collection of indicators of measuring entrepreneurship (OECD, 2009) and the World Bank study (Doing Business, 2014). The general principle of these and other similar studies is to collect several groups of indicators of entrepreneurial activities (such as indicators of enterprise population, enterprise birth and death rates and issues related to entrepreneurial culture, capabilities etc.). Such collected indicators can be very useful and have a relatively high level of information capacity. However, they do not take into consideration the influence and importance of entrepreneurship support policies. Entrepreneurship performance is monitored at business level. One of the famous models for measuring business performance and the probability of bankruptcy is Altman’s model (e.g. Pitrova, 2011). The performance measurement in municipal companies is dealt with by Plevny (2014).

Despite this, only a small amount of attention has been paid to the simple task of how to ensure and provide for the monitoring of the impact of these entrepreneurship support policies. There is no unanimous view of which methods are suitable for evaluation of the programs’ efficiency. Several studies that discuss this topic exist. For example, there is an evaluation of national results of concrete support in terms of results attained, e.g. (Ministry

of Industry and Trade CZ, 2014; Transparency International, 2007). However, the evaluation focuses primarily on the speed of support implementation, and further on finding purely administrative data without any feedback on the part of the business or taking into regard other factors of the business environment. Therefore, the important question in this respect is: *“How can we measure the effect of ongoing entrepreneurship policy in general?”*

3.1 Research tools

A more quantitative, and also qualitative, view should be taken into consideration and built into an appropriate measuring methodology. These results have been confirmed by other scholars, such as Kennerley and Neely (2003), and Neely, Gregory and Platts (1995).

There is no unique solution to this topic, but several methods or sets of methods should be proposed for further consideration. In most cases it is easier to get access to procedures that preceded the formation of selected support than to acquire information on the evaluation of the effects of this instrument on business activity. Where it is possible to gain data on effect evaluation, these evaluations are mostly reduced only to the control of formal correctness and financial audits. With regard to the above-mentioned facts, we have compiled a selection of appropriate methods that may be used (Table no. 2). The methods focus on the possibilities of acquiring both quantitative and qualitative data. We believe that the relationship in question can only be assessed with the help of careful post-analysis. The table shows a combination of several types of methods, some of a social research character, and others of a financial or statistical character.

Table no. 2: Suitable methods of measuring of the impact of entrepreneurship policies

Method	Application	Advantages	Disadvantages	Comment	Method suitable for
Local evaluation	At regional level	Mobilization of local community resources	Internal evaluators are often used, which may lead to bias and reduced independence of the evaluation.	Evaluation questions are relevant for the needs and interests of local subjects involved.	Direct and indirect support tool
Polls among beneficiaries	Questionnaire research is used.	It can involve both quantitative and qualitative data.	Dependent of availability of information on the beneficiary.	It takes interest in results which can be generalized throughout the whole group. Suitable for observation of intervention results and effects with a sufficiently homogenous group.	Direct and indirect support tool
Individual interviews	Used to obtain qualitative data.	Provide detailed information.	The sample is usually smaller, random selection is not used.	Suitable for gaining a more detailed insight into the issue.	Direct and indirect support tool
Group discussions	Takes the form of a structured discussion (6-8 persons for approx. 1.5 hours).	Participation of several people secures certain balance in the responses.	The discussion may be biased.	Various interested subjects are engaged.	Direct and indirect support tool

Method	Application	Advantages	Disadvantages	Comment	Method suitable for
Use of administrative data	This serves to provide information on the key data and to provide primary data for follow up of the outputs over the course of time.	If well formulated and elaborated, they can be a rich source of quantitative (and also sometimes qualitative) information.	Dependent on the quality of work – in particular regarding accuracy, completeness and accessibility.	Good quality evidence and well set up indicators to be followed are necessary.	Direct tool
Regressive analysis	It is used to understand statistical dependence of one variable on other variables.	It gives an opportunity to specify hypotheses concerning the nature of the effects including explanatory factors.	A large database is necessary.	Demanding method, requiring sufficient qualified data, which often poses a problem.	Direct tool
Analysis of costs and returns	The aim is to determine whether the studied reality contributes towards prosperity of the society with the help of a sum of discount economic expenses and yields of the reality in question.	It is a tool to formulate an opinion of economic and social suitability of the studied reality.	It does not take into account the effect on the economic recovery of /expenses and yields, which cannot be expressed in financial terms.	The method is designed to determine a net economic effect.	Direct tool
Multi-criteria analysis	A technique allowing us to take several criteria into consideration at the same time.	Various assessments are combined, which are good to be taken into consideration in decision making	The chosen criteria are often subject to gradual changes in reality.	A suitable method for a more complex perception of the studied subject and factors at play.	Direct and indirect support tool
Expert panels	Especially formed group of independent experts who meet for the purpose of evaluation.	Suitable for evaluation of complex phenomena where it is too complicated to quantify criteria and formulate substantiation of the conclusions.	Experts must have profound knowledge in the given area, a risk of bias.	Time-consuming method.	Direct and indirect support tool

*Source: own representation; Tausl Prochazkova, 2013;
Ministry of Regional Development CZ, 2005*

3.2 Proposal of concrete methodology

We are going to utilize the multi-criteria analysis, which, by its nature, allows consideration of several indicators that are different in character. Multi-criteria analysis is one of the suitable methods of measuring of the impact of entrepreneurship support policies, as it is

obvious from Table no. 2. In particular, we suggest a methodology based on the multi-criteria evaluation of selected indicators, both at the macro- and micro-economy level.

The proposed model aims at a possible methodology of the measurement of effectiveness of entrepreneurship policies. Indicators of a micro economic character (at the level of the entrepreneurship subject) and macro-economic character (at the regional level) are chosen. Thus it is necessary to consider macro-economic indicators for the given region, where the effect of the applied support is to be measured, as well as micro economic indicators related to the supported entrepreneurship subject. Macro-economic level indicators are usually represented by the following:

- I₁ – GDP in the region per capita;
- I₂ – disposable income of households per capita;
- I₃ – investment in information technologies per capita;
- I₄ – research and development expenses in the region per capita;
- I₅ – migration in the region – balance of population increase and decrease with migration per 1,000 inhabitants;
- I₆ – number of applicants for 1 vacancy;
- I₇ – average gross monthly income in the region;
- I₈ – proportion of inhabitants with a lower income than subsistence level;
- I₉ – value of paid social welfare money in the region per capita;
- I₁₀ – investment in environmental protection per capita;
- I₁₁ –CO, SO₂ and NO_x emissions– average values of these three oxides measured in the region.

Micro economy level indicators are usually represented by the following indicators:

- I₁₂ – EBIT – Earnings before Interest and Taxes;
- I₁₃ – ROA – Return on Assets;
- I₁₄ – EBITDA – Earnings before Interest, Taxes, Depreciation and Amortization;
- I₁₅ – ROS – Return on Sales;
- I₁₆ –ROE – Return on Equity;
- I₁₇ – current ratio – current assets / current liabilities;
- I₁₈ – cash position ratio – short-term financial assets / current liabilities;
- I₁₉ – quick ratio = (current assets – inventory) / current liabilities;
- I₂₀ – creditor risk indicator = total debt / total assets;
- I₂₁ – interest coverage = EBIT / expenses interests;
- I₂₂ – total assets turnover ratio = revenues / total assets;
- I₂₃ – proportion of employees involved in training organized by the employer or a hired company;
- I₂₄ – employment – number of employees in the company.

In general, the selected indicators are aggregated into a synthetic one where percentage changes of the indicators are included with respect to the previous period, so that it is possible to assess the impact of the provided support in time. The synthetic indicator can answer whether the impact of the provided program support was efficient.

In order to formulate reasonable synthetic indicators, we do so by first taking similar formal form and, second, making them applicable for the macroeconomic level as well as for microeconomic one, thus adopting simple weighted averages in the generic form

$$\eta = \sum_{i=1}^n w_i a_i, \quad (1)$$

where w_i denotes corresponding weights, a_i indicators selected, both non-negative ones, and furthermore assuming $\sum_{i=1}^n w_i = 1$, to hold, i.e. weights are normalized.

3.2.1 Determining the weights of individual indicators

Since the number of the presented eleven indicators I_1, \dots, I_{11} for the macro economy level, and thirteen ones I_{12}, \dots, I_{24} , in particular, the micro economy level is relatively high, and moreover, they are not of the same dimensionalities, and thus we have started with the question of how to reduce them, i.e. how to select suitable subsets from both indicator sets.

It is well-known that determining weights of individual indicators is a very subjective part of the multi-criteria evaluation. Hence, we decided to build an expert panel with the participation of five experts, and asked them to select the most important and homogeneous dimensionality indicators from both sets. Finally, we formed a conjunction of the submitted subsets, and we gained four indicators for the macro economy level and five for the micro economy one. The procedure is sketched formally by expressions (2)

$$\cap_r \{I_1, \dots, I_{11}\} \rightsquigarrow \{I_1, I_4, I_7, I_9\} = \{K_{r,1}, K_{r,2}, K_{r,3}, K_{r,4}\} = \{K_{r,i}, i=1, \dots, 4\}, \quad (2)$$

$$\cap_f \{I_{12}, \dots, I_{24}\} \rightsquigarrow \{I_{13}, I_{17}, I_{20}, I_{21}, I_{22}\} = \{K_{f,1}, K_{f,2}, K_{f,3}, K_{f,4}, K_{f,5}\} = \{K_{f,j}, j=1, \dots, 5\},$$

where $\cap_q, q=r, f$ denote conjunction on economy indicator sets. From now on, we shall use sub-index “r” to denote the macro economy (regional) level, and “f” for the micro economy (firm) one, in order to shorten our notations.

Expression (1) yields the following synthetic indicators

$$\eta_r = \sum_{i=1}^4 w_{r,i} a_{r,i}, \quad \eta_f = \sum_{j=1}^5 w_{f,j} a_{f,j} \quad (3)$$

where $w_{r,i}, a_{r,i}$, and $w_{f,j}, a_{f,j}$ are corresponding weights and indicator values of indicators subsets $\{K_{r,i}\}$ and $\{K_{f,j}\}$, in region, and firm, respectively.

For determination of weights, we have adopted the procedure based on AHP technique. There are many references to AHP, its applications, and generalizations, as well. Since the AHP belongs to more general framework of MCDA (Multi-Criteria Decision Analysis) we refer Charouz and Ramík(2010) for financial portfolio management, and Fotr at al.(2013) for project portfolio optimization. Several different methods suitable for MCDA summarizing their advantages and disadvantages are given in Ivlev et al. (2014) being focused upon a multifaceted approach to medical equipment management in particular, and Wang et al. (2009) who reviews MCDA as an aid in sustainable energy decision-making. Of course, we refer Saaty (2000) representing a fundamental source for MCDA and its

applications. However, basic properties of AHP, practical techniques, and algorithms which suit our purposes well are included in Brunelli et al.(2011), Formav and Gass (2001), Koczkodaj and Orłowski(1997), and Ramík and Vlach (2013).

Procedure scheme:

Step 1. – Collection of pair-wise comparison matrices $\{\mathbf{P}_{r,k}, \mathbf{P}_{f,k}\}$ from experts $e_k, k=1, \dots, 5$.

In order to maintain multiplicative reciprocity (m-reciprocity, in short) of these matrices, which is the basic property of pair-wise comparison matrices in AHP framework, we collected all elements of upper triangular sub-matrices only, i.e. $p_{(q,k)ij}, i=1, \dots, n_q, j=i, \dots, n_q$ for $q=r, f$, with $n_r=4$, and $n_f=5$, and $k=1, \dots, 5$. Thus, elements of corresponding lower triangular sub-matrices were simply calculated

$$p_{(q,k)ji} = 1/p_{(q,k)ij}, \quad i=1, \dots, n_q, j=i, \dots, n_q. \tag{4}$$

Where we packed (q,k) together in order to separate them clearly from matrix element generic indices i, j .

Step 2. – Average of matrices $\{\mathbf{P}_{r,k}, \mathbf{P}_{f,k}\} k=1, \dots, 5$.

We have decided to build an average of matrices $\mathbf{Q}_r, \mathbf{Q}_f$ to get the most objective pair-wise comparison of matrices prospectively. Let U, L, and D denote operators extracting upper triangular sub-matrix, the lower triangular one, and the diagonal one of any square matrix. First, we calculate

$$U(\mathbf{Q}_q) = \sum_{k=1}^5 U(\mathbf{P}_{q,k}), \quad q=r, f, \tag{5}$$

and next, using the upper triangular sub-matrices we fill elements of $L(\mathbf{Q}_q)$ just with their reciprocal ones from $U(\mathbf{Q}_q)$, following (4), in general. Finally, we get (6), where $\mathbf{D}=\mathbf{I}$,

$$\mathbf{Q}_q = L(\mathbf{Q}_q) + \mathbf{D} + U(\mathbf{Q}_q), \quad q=r, f. \tag{6}$$

Such matrices $\mathbf{Q}_r, \mathbf{Q}_f$ fulfil m-reciprocity, but lack m-consistency, in general. However, it is also a very important property within AHP theory. Multiplicative consistency (m-consistency, in short) is defined for any pair-wise comparison matrix \mathbf{P} requiring to hold in general $p_{ij}p_{jk} = p_{ik}$ for any i, j , and k .

Following Koczkodaj and Orłowski (1997) this procedure, we construct matrices $\mathbf{R}_r, \mathbf{R}_f$ from $\mathbf{Q}_r, \mathbf{Q}_f$, which fulfil both m-reciprocity and m-consistency. They represent ideal approximations of \mathbf{Q}_r and \mathbf{Q}_f within AHP framework. The results are summarized in Table no. 3.

Table no. 3: Consistency indices and ratios

CI(\mathbf{Q}_r)	CR(\mathbf{Q}_r)	CI(\mathbf{R}_r)	CI(\mathbf{Q}_f)	CR(\mathbf{Q}_f)	CI(\mathbf{R}_f)
0.136163	0.151292	0.0	0.0338008	0.0301793	0.0

Consistency index CI and consistency ratio CR are defined for any pair-wise comparison matrix \mathbf{P} of size $n \times n$ as follows

$$CI(\mathbf{P}) = (\lambda_{\max} - n) / (n - 1), \quad CR(\mathbf{P}) = CI(\mathbf{P}) / RI(n), \tag{7}$$

where λ_{\max} is maximal eigenvalue of matrix \mathbf{P} , and $RI(n)$ is the so-called “random consistency index” depending upon n . Following the theory of AHP in our case, $RI(4) = 0.90$, $RI(5) = 1.12$, for $\mathbf{Q}_r, \mathbf{Q}_f$. Calculated eigenvalues are $\lambda_{\max}(\mathbf{Q}_r) = 4.40849$, $\lambda_{\max}(\mathbf{Q}_f) = 5.1352$, respectively, whereas $\lambda_{\max}(\mathbf{R}_r) = 4.000$, and $\lambda_{\max}(\mathbf{R}_f) = 5.000$.

Generally accepted level of CR within AHP framework is 0.1. Hence, Q_f serves us better to DM purposes than Q_r , but we will exploit the latter as well.

Step 3. – Calculation weight vectors w_q, ω_q of matrices $Q_q, R_q, q=r, f$.

All calculations are performed by our purpose-oriented Mathematica® notebook that we have developed. Calculated components of all weight vectors are given in Table no. 4.

Table no. 4: Components of weight vectors w_r, ω_r , and w_f, ω_f

	$i = 1$	$i = 2$	$i = 3$	$i = 4$	$i = 5$
w_r	0.439910	0.296075	0.196425	0.0675902	
ω_r	0.454593	0.291749	0.186203	0.0674555	
w_f	0.441586	0.224805	0.0789276	0.0890840	0.165598
ω_f	0.449489	0.218459	0.0783166	0.0899852	0.163750

The component-wise differences $w_r - \omega_r$, and $w_f - \omega_f$ are shown in Figure no. 1.

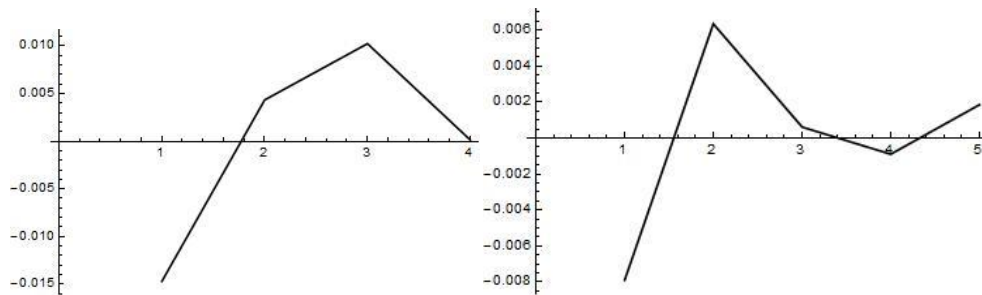


Figure no. 1: On the left $w_r - \omega_r$, and on the right $w_f - \omega_f$

In Figure no. 2, we show all calculated weights for Q_r, Q_f , and R_r, R_f , and $\{P_{r,k}, P_{f,k}\}, k=1, \dots, 5$. For better orientation, we have separated weights for Q_q and R_q , from ones for $\{P_{q,k}\}$ by blank row with zero weights only. Further, we used “e6” to identify Q_q , “e6a” to R_q , and “ek” to $P_{q,k}, k=1, \dots, 5$, respectively.

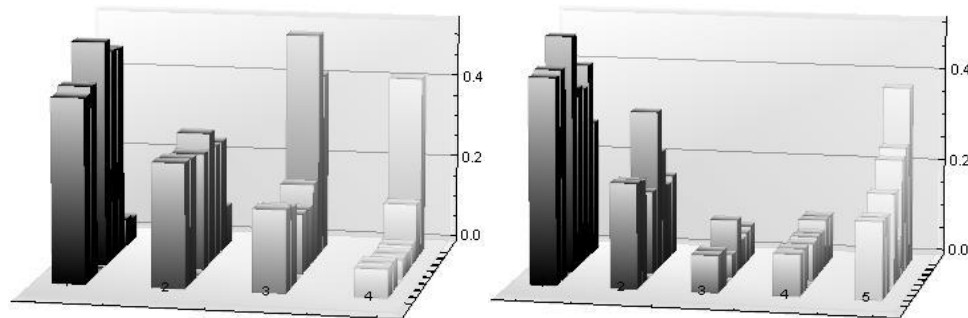


Figure no. 2: On the left are weights for $\{P_{r,k}\}, Q_r, R_r$, and on the right are weights for $\{P_{f,k}\}, Q_f, R_f$

3.3 Application – case study

There are various entrepreneurship support policies (CzechInvest, 2014a). The Operational Program Enterprise and Innovation is one of the most known tools for entrepreneurship support. This program is focused on increasing the competitiveness of the Czech economy and respective regional development based on the NUTS system of regional subdivision (Ministry of Regional Development, 2015), mainly of small and medium-sized companies. Beneficiaries of the support are businesspeople, business associations, research institutions, universities, etc.

The suggested methodology of evaluation of effectiveness of entrepreneurship policies will be verified by means of application of a synthetic indicator based upon AHP technique to supported company in the West Bohemia Region in the form of a financial grant provided through the Operational Program Entrepreneurship and Innovation, Potential – Open Call I in the year 2010 (this year has been chosen for availability of all data necessary to apply the indicator) (CzechInvest, 2014b).

Out of the set of supported projects in 2010, a subject has been chosen that met the following criteria:

- The enterprise obtained and correctly used support,
- The amount of support was more than 1 million CZK (Czech crowns).

The company Hofmeister, s.r.o. (Ltd), located in Pilsen, with a mechanical engineering production line specialized both in wide-range machinery tools and special-purposed ones in particular, will be used for the application of our proposed methodology.

Collected data values of indicators $\{K_{r,i}\}$ on the macro economy (“r”) level, represented by vector \mathbf{a}_r , and $\{K_{f,j}\}$ of the micro economy (“f”) level, represented by \mathbf{a}_f , covering years 2010 and 2011, are summarized in Table no. 5.

Table no. 5: Components of vectors \mathbf{a}_r in [CZK], and \mathbf{a}_f [dimensionless]

	$a_{r,1}$	$a_{r,2}$	$a_{r,3}$	$a_{r,4}$	$a_{f,1}$	$a_{f,2}$	$a_{f,3}$	$a_{f,4}$	$a_{f,5}$
2010	319564	4012	21989	3536	0.0393	2.5320	0.4960	7.1606	1.7594
2011	326513	5476	22452	3087	0.0795	2.7880	0.5050	10.1859	2.0320

Source: Czech Statistical Office, 2014; Hofmeister, s.r.o., 2014

Using this data and weights \mathbf{w}_r , $\boldsymbol{\omega}_r$, and \mathbf{w}_f , $\boldsymbol{\omega}_f$, we calculate first synthetic indicators

$$\gamma_{Q,q}(2010) = (\mathbf{w}_q, \mathbf{a}_q(2010)), \quad \gamma_{Q,q}(2011) = (\mathbf{w}_q, \mathbf{a}_q(2011)), \quad q = r, f, \tag{8}$$

$$\gamma_{R,q}(2010) = (\boldsymbol{\omega}_q, \mathbf{a}_q(2010)), \quad \gamma_{R,q}(2011) = (\boldsymbol{\omega}_q, \mathbf{a}_q(2011)),$$

where (\mathbf{a}, \mathbf{b}) represents a scalar product of vectors \mathbf{a} and \mathbf{b} , in general.

Table no. 6: Absolute synthetic indicators

	$\gamma_{Q,r}$	$\gamma_{R,r}$	$\gamma_{Q,f}$	$\gamma_{R,f}$
2010	146625.	150775.	1.55496	1.54210
2011	149876.	154417.	1.94562	1.93367

However, these synthetic indicators are not easy to handle when expressed in absolute values. In order to overcome this disadvantage and to gain good and understandable

measures, we have to calculate relative growth ratios using a generic expression in the following form

$$(a_{2011} - a_{2010})/a_{2010}, \tag{9}$$

where a_{2010} and a_{2011} stand for any corresponding components of \mathbf{a}_r and \mathbf{a}_f given in 2010 and 2011, respectively.

Thus, using the values given in Table no. 5 and expression (9), we have calculated vectors of relative growth ratios ϕ_r , and ϕ_f , respectively, the components of which are depicted in Figure no. 3.

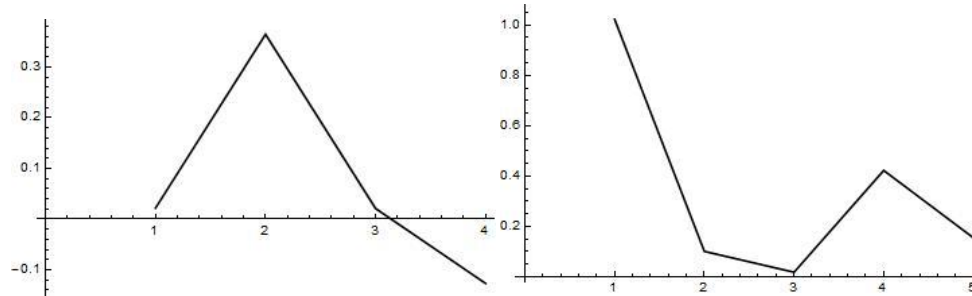


Figure no. 3: Components of ϕ_r (on left), and ϕ_f (on right), i.e. relative growth ratios

By comparing maximal values of ϕ_r , and ϕ_f components, we conclude that $\phi_{f,1}$ is almost three times bigger than $\phi_{r,2}$, which may suggest that an influence of support elevates a level of company in some sense, but a level of region as well, however only in a fractional scope. Thus, such a comparison stands in agreement with general and intuitive scoring of influence of supports. However, it is still too vague and therefore we shall try to express it more precisely using the AHP approach.

Based upon generic expression (1), using weight vectors \mathbf{w}_r, ω_r , and \mathbf{w}_f, ω_f expressing preferences inherently contained in the pair-wise comparison matrices $\mathbf{Q}_r, \mathbf{R}_r$, and $\mathbf{Q}_f, \mathbf{R}_f$ being presented and using vectors of relative growth ratios ϕ_r , and ϕ_f related to regional level and company level, respectively, we can already calculate the following synthetic indicators ζ_q , and $\psi_q, q=r, f$, concerning regional level and company level separately.

Again, they are expressible in scalar products (10), thus reminding us of the fundamental role of matrices \mathbf{Q}_q , and \mathbf{R}_q by their weight vectors \mathbf{w}_q , and ω_q , respectively.

$$\zeta_r = (\mathbf{w}_r, \phi_r), \zeta_f = (\mathbf{w}_f, \phi_f), \quad \psi_r = (\omega_r, \phi_r), \psi_f = (\omega_f, \phi_f). \tag{10}$$

These relative synthetic indicators are summarized in Table no. 7, and depicted in Figure no. 4.

Table no. 7: Relative synthetic indicators

ζ_r	ψ_r	ζ_f	ψ_f
0.0242677	0.0241553	0.251235	0.253920

These values show a good and coherent result that support influence on the company (micro economy) level is about ten times more recognizable than on the regional (macro economy) level. Thus, such a result may again seem acceptable; however, it is much better when underlined by a serious DM procedure based upon AHP technique, in comparison to the rough conclusion yielded by simply comparing maximal value components of ϕ_r , and ϕ_f as discussed earlier.

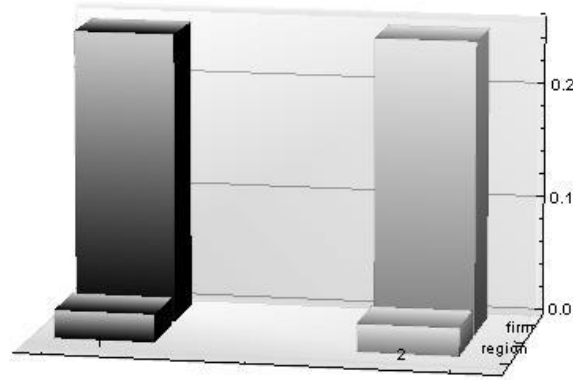


Figure no. 4: Relative synthetic indicators (10), ξ_q on left, ψ_q on right

All calculations and graphical outputs were performed by the purpose-oriented Mathematica® notebook we developed. The source code is obtainable upon request.

Conclusions

In this paper, the effectiveness of entrepreneurship support policies and possibilities of its measurement are discussed. The primary aim of this paper is to propose a contingency framework for investigating entrepreneurship support policies' effectiveness. First, authors indicate specific facts from literature on entrepreneurship-related contingencies regarding the nature of entrepreneurship and its methods of support. Following this, a set of appropriate methods of measuring the impact of entrepreneurship policies is drawn and discussed. Finally, the proposal of own methodology for measuring effectiveness of entrepreneurship policies is provided, as well as a practical application.

The paper points out suitable indicators that can help us find an appropriate solution to the issue at hand. Proposed methodology can be considered one of the possible approaches to finding out the connectedness and efficiency of entrepreneurship policies to entrepreneurship outcomes and the business environment in general. Its construction provides a certain degree of variability, mainly in terms of macro and micro indicators. These indicators can be modified when it is necessary or considered useful. Methodology is based on two levels. The first level is exploring the influence on supported companies. The second one explores the influence on a chosen region in which the support policy was provided. To confirm a positive effect of the entrepreneurship policy on a supported company and region, we assume that there should be an increase of observed indicators on the company and region level. The proposed methodology was examined using a case study. For the purposes of the case study, a specific company was chosen which was financially supported by one of the entrepreneurship support policies. The company is situated in the West Bohemia Region in the Czech Republic, so data regarding this region was used. The results of this case study unambiguously proved a significant increase of company financial results and also an improvement on the regional level, which has a slower tempo in comparison to the company one. Such a simple case study confirmed our expectations and proved that measuring entrepreneurship policy effectiveness by using multi-criteria analysis and synthetic indicators was the right option.

On the other hand, there are some limitations that should be mentioned. First, determining the relevancy of weights with individual indicators may be a subjective matter. That is why it would be advisable to invite a greater number of experts to this procedure. Second, there is a question of acquiring the necessary data. Macroeconomic indicators are stated regularly by statistical offices, which imply that their application in this methodology should not pose a problem. Finding out indicators at the microeconomic level might be more complicated as the financial statements of companies from where such data would be drawn are usually published annually. Third, it must be noted that the proposed methodology is designed for the evaluation of companies of a profit character. In the case of non-profit companies, other indicators are to be chosen, or at least indicators with a different scale of importance assigned to them.

We are aware of the extent of the discussed area and emphasize that it is more than necessary to point out the need for a consistent focus on connecting business, its support and outputs, the monitoring of which does not reach the appropriate standard in most countries. As the case study proved the correctness of our expectation, our future research goal is to examine the proposed methodology using larger sample of supported companies. Also, a higher number of experts are expected to join the expert panel. As it was proved by this case study, expert weight evaluation was quite similar on the company level, while a higher diversity was observed on regional level. Therefore, a higher number of experts will be used for future examination.

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