

CLUSTER PERFORMANCE MANAGEMENT

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Abstract

The presented article is based on research evaluating the impact of cluster organisations on the financial performance of member entities. The author's doctoral thesis examines whether there is a difference in the financial performance of cluster organisations created through the bottom-up and the top-down approaches, under the conditions existing in the Czech Republic. Both types of clusters that meet the condition of maturity (established before or in 2012) and of a high degree of activity were selected for the research. The financial performance of member business entities was assessed using the following indicators: ROA, ROE, ROS, EVA, EVA/employee and EVA/sales. The aim of the research was to demonstrate whether public support for clusters would be reflected in member entities' better financial performance. The final part of the paper then summarises and discusses the findings.

Keywords

Cluster; Financial performance; Cluster organization; Top-down; Bottom up; Economic value added.

Introduction

In today's global market environment, which is characterised by a high degree of competition, it is important to constantly look for ways to improve the performance and competitiveness of businesses [1]. According to Estélyiová and Koráb [2], one of the consequences of globalisation and technological development is the emergence of inter-organisational partnerships. Inter-organisational partnerships may take a wide range of forms, from unilateral agreements to business networks. Clusters, too, are categorised as a specific form of business networks. As a general concept, a cluster can be understood as the interconnection of businesses and other institutions in a certain geographical area, which benefits those involved and results in a competitive advantage [3]; [2]. Porter [4] defines a cluster as a geographically proximate group of interconnected companies, suppliers, and associated institutions in a particular field as well as companies in related fields that compete and also co-operate with each other. Over the past two decades, technical publications have addressed the issue of clusters, especially in relation to business performance. The doctoral thesis on the topic focuses on one form of inter-organisational partnership, which is considered by experts as a possible tool to support the competitiveness and performance of countries, regions and companies – namely clusters.

The establishment and development of clusters is one of the trends in economic and regional innovation policy. Many experts, such as D'Alise et al. [5], consider clusters as a key source of regional and national competitive advantage. The past two decades witnessed a great wave of interest in the area of clusters on the part of both experts and economic policy makers, and support for clusters became the predominant strategy to support economic development in

most foreign countries. Despite all the advantages that clusters offer, the impact of the cluster concept on member entities' competitiveness and performance is yet to be fully objectively quantified. Given the above, it is therefore necessary to pay increased attention to this issue.

The article examines the impact of business entities' membership in a cluster organisation (institutionalised form of a cluster, i.e. a voluntary grouping of entities within one organisation that has its own identification number) on their financial performance. The basic premise of this article is that the benefits resulting from a business entity's membership in a cluster organisation should, among other things, be reflected in improved financial performance of that entity, which is why the following assumption needs to be verified: Do cluster organisations really have a positive effect on the financial performance of member business entities? The research in the article will focus on delivering qualitative and quantitative evidence for the linkage suggested above.

The article aims to determine whether – under the conditions existing in the Czech Republic – business entities' membership in cluster organisations has a positive effect on the financial performance of those business entities, and whether there are differences in the financial performance of member entities of two types of cluster organisations – organisations established primarily on the initiative of member entities, with no direct public support (bottom-up cluster organisations) and organisations established with support from public budgets (top-down cluster organisations).

1 Research Objective and Methodology

The main objective of the research was to determine whether there were differences in the financial performance of member business entities of COs that had been established through the bottom-up approach and member business entities of COs that had been established through the top-down approach.

Given the considerable diversity of the various cluster organisations in terms of their date of establishment, and also given the availability of financial statements, the research focused on the period 2012–2017. Business data for 2018 are not yet available for a significant portion of business entities in both countries. The research within the article as a whole can be divided into the following 8 steps:

Step 1: Selection of suitable cluster organisations (hereinafter CO). The chosen COs must meet the three conditions listed below, while the last and the fourth condition are only recommended, not mandatory.

1. Only highly active COs are included in the research.
2. Only highly active COs in the maturity phase (i.e. organisations established before or in 2012) are included in the research.
3. It is possible to obtain a list of member entities for the COs.
4. The COs hold the international Cluster Management Excellence label.

Step 2: Defining the research samples and compiling a list of companies to be evaluated.

The entire research within the article is based on comparing two research samples. The first research sample comprises the cores of highly active COs that are in the maturity phase, operate in the Czech Republic, and were established through the top-down approach. The second research sample comprises the cores of highly active COs that are in the maturity phase, operate in the Czech Republic, and were established through the bottom-up approach.

Step 3: Compiling a list of subsidies received for CO projects. For both the first and the second research sample, a list subsidies and repayable financial assistance received from the state budget needs to be extracted from CEDR III IS for the period 2004–2017 [6].

Step 4: Determining the number of employees. As the fourth step, data on the number of employees were obtained from the MagnusWeb commercial database for both research samples.

Step 5: Gathering financial statements and extracting data from the financial statements. For the above research samples, the required data from financial statements for 2012–2017 needed to be extracted from the public register.

Step 6: Calculating economic value added. For each of the business entities, the economic value added indicator (hereinafter EVA) was then calculated. The EVA indicator was calculated using the EVA equity method (see formula 1). The CAPM model was used to estimate the cost of equity (r_e).

$$EVA = (ROE - r_e)E \quad (1)$$

The CAPM method was used to estimate the cost of equity (see formula 2). Where r_f is the risk-free rate of return, often taken as the rate of return on treasury bills; β_n is the quantity used to measure the systematic risk of the asset; r_m is the expected rate of return in the market. National stock indices are most often used to determine the expected rate of return in the market r_m [7].

$$r_e = r_f + \beta_n(r_m - r_f) \quad (2)$$

Step 7: Calculating other financial indicators. Furthermore, the following financial performance indicators were calculated in order to be compared between the research samples: return on equity (ROE), return on assets (ROA), return on sales (ROS), EVA per employee and EVA per sales.

Step 8: Comparing the selected characteristics for the different research samples. As the last step of the research, the differences between the values for the above research samples were compared using the non-parametric Wilcoxon-Mann-Whitney W-test.

2 Results and Discussion

As part of the research within the doctoral thesis, two types of COs were compared with each other. In total, these included 22 COs that had been established through the top-down approach and 8 COs established through the bottom-up approach. To compare the differences in member businesses' financial performance in each year, the following indicators were selected: ROA, ROE, ROS, EVA, EVA per employee, and EVA per sales. In order to test the above hypothesis, it was necessary to obtain information on whether all data were normally distributed. The normality of all data samples was tested at a significance level of 5% using the Shapiro-Wilk test, where the null hypothesis assumes that the sample comes from a normally distributed population. Since the Shapiro-Wilk significance test showed that none of the indicators was normally distributed, a non-parametric test was used to verify the hypothesis, namely the Wilcoxon test. The Wilcoxon test, which was used as evidence for the outputs presented in this paper, was performed at a 10% significance level.

Tab. 1: Wilcoxon W-test and p-values for the ROA, ROE and ROS indicators

Indicator	ROA		ROE		ROS	
	W	P-value	W	P-value	W	P-value
2012	11326	0.1963	11697	0.3666	12978	0.6598
2013	12788	0.8097	13305	0.4335	14119	0.1016
2014	12541	0.9862	12961	0.6728	14150	0.0949*
2015	13017	0.6305	13758	0.2082	15044	0.0091**
2016	7037	0.0000**	13428	0.3616	13969	0.1389
2017	12872	0.7422	13758	0.2082	13328	0.4194

** significance level of 5%

* significance level of 10%

Source: Own

Tab. 2: Wilcoxon W-test and p-values for EVA-based indicators

Indicator	EVA		EVA/employees		EVA/sales	
	W	P-value	W	P-value	W	P-value
2012	12375	0.8481	11368	0.2120	11327	0.1967
2013	14329	0.0632*	13040	0.6134	12667	0.9094
2014	13031	0.6201	12455	0.9144	11970	0.5376
2015	13745	0.2132	13577	0.2852	13112	0.5614
2016	13322	0.4231	12443	0.9044	12791	0.8073
2017	14286	0.0699*	13039	0.6141	12931	0.6959

** significance level of 5%

* significance level of 10%

Source: Own

Tables 1 and 2 show that while there are some differences between the financial performance of member businesses of the two CO types, these are not statistically significant with few exceptions. E.g. in 2013 and 2017 the EVA indicator for bottom-up clusters took a more favourable value, albeit still negative. In 2014 return on sales was also more favourable for member companies of bottom-up clusters. Table 2 shows that the result is conclusive not only at a significance level of 10%, but also of 5%. One of the cases was the year 2015 for bottom-up clusters, where member companies' return on sales improved somewhat. However, subsequent trends clearly show that this was merely a one-off fluctuation. Another exception was the year 2016 for bottom-up clusters, where member companies' return on assets declined. However, subsequent trends clearly show that this too was merely a one-off fluctuation. Nonetheless, it was also proven that the financial performance of top-down COs was not significantly better than that of bottom-up COs in any of the other years under review.

Based on the research, it can be concluded that public support that had been invested in the establishment and development of top-down COs in the Czech Republic did not have any significant effect on improving the financial performance of their member business entities. It can thus be assumed that businesses in bottom-up COs were able to catch up with businesses in top-down COs. The efficiency of public support spent on cluster development is thus questionable. However, that does not automatically support the conclusion that clusters as such cannot be a successful tool to promote the competitiveness of businesses. Nonetheless, the research did not confirm that targeted top-down COs have a more significant effect on member businesses' financial performance.

Conclusion

The aim of the research was to determine whether there were differences in the financial performance of member business entities of COs that had been established through the bottom-up approach and member business entities of COs that had been established through the top-down approach.

The values of financial indicators were not confirmed to be statistically significantly higher for member businesses of bottom-up COs than for businesses in top-down COs. For the member businesses of both types of COs, it was thus impossible to prove any statistically significant differences in financial performance. This research did not confirm that top-down COs, i.e. those established with a clear intent, have a more significant effect on financial performance. The research confirmed the scepticism of some authors, such as Bresnahan, Gambardella and Saxenian [8], as to the effectiveness of COs and the possible inefficiency of their public support.

Both the research and the analysis of the COs supported the views of Stejskal and Kovárník [9], who believe that certain COs often form as a grouping of several entities without a high-quality cluster analysis, with their primary objective being to obtain public money. Therefore, some experts, such as Kiese [10], consider the establishment of COs through the public administration mechanism to be worse than the establishment of COs through the private administration mechanism. The question also remains as to what was the real reason why some COs do not use public support. Whether they did not apply for public support at all, or whether their applications were rejected.

Literature

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ŘÍZENÍ VÝKONNOSTI KLASTRŮ

Předkládaný článek vychází z výzkumu hodnocení vlivu klastrových organizací na finanční výkonnost členských podnikatelských subjektů. Disertační práce autorky zjišťuje, zda v podmínkách České republiky existuje rozdíl mezi finanční výkonností klastrových organizací vzniklých přístupem bottom-up a top-down. Do výzkumu byly vybrány oba typy klastrů splňující podmínku zralosti (vznik před rokem 2012 včetně) a vysoké aktivity. Finanční výkonnost členských podnikatelských subjektů byla hodnocena pomocí ukazatelů ROA, ROE, ROS, EVA, EVA/zaměstnanec a EVA/tržby. Cílem výzkumu bylo prokázat, zda se veřejná podpora klastrů odrazí ve vyšší finanční výkonnosti členských subjektů. V závěrečné části článku jsou poté shrnuty a diskutovány zjištěné výsledky.

CLUSTER-LEISTUNGSMANAGEMENT

Der vorliegende Artikel beruht auf der Untersuchung der Bewertung des Einflusses von Clusterorganisationen auf die finanzielle Leistungskraft der unternehmerischen Mitgliedskörper. Die Dissertationsarbeit des Autors stellt fest, ob in den Bedingungen der Tschechischen Republik ein Unterschied existiert zwischen der finanziellen Leistungskraft von Clusterorganisationen, die durch den Zugriff auf Bottom-up oder Top-down entstanden sind. In der Untersuchung wurden beide Typen ausgewählt. Voraussetzung war, dass sie die Bedingungen der Reife (Entstehung von 2012 einschließlich) und hohe Aktivität erfüllen /ausweisen. Die finanzielle Leistungskraft der unternehmerischen Mitgliedskörper wurde mit Hilfe der Indikatoren/Instruktoren ROA, ROE, ROS, EVA, EVA/Mitarbeiter und EVA/Erträge, bewertet. Das Ziel der Forschung war zu zeigen, ob sich eine öffentliche Unterstützung der Cluster in einer höheren finanziellen Leistungskraft der Mitgliedskörper widerspiegelt. Im abschließenden Teil des Beitrages werden die Ergebnisse zusammengefasst und diskutiert.

ZARZĄDZANIE EFEKTYWNOŚCIĄ KLASTRÓW

Niniejszy artykuł bazuje na badaniach oceny wpływu organizacji klastrowych na efektywność finansową przedsiębiorstw członkowskich. W pracy dysertacyjnej autor badał, czy w warunkach Republiki Czeskiej istnieje różnica pomiędzy efektywnością finansową organizacji klastrowych powstałych w wyniku podejścia bottom-up i top-down. Do badań wybrano oba typy klastrów spełniających warunek dojrzałości (powstanie przed 2012 rokiem włącznie) oraz wysokiej aktywności. Efektywność finansową przedsiębiorstw członkowskich została oceniona przy pomocy wskaźników ROA, ROE, ROS, EVA, EVA/pracownik i EVA/przychody. Celem przeprowadzonych badań było wskazanie, że pomoc publiczna klastrów wpływa na większą efektywność finansową ich członków. W końcowej części opracowania podsumowano i omówiono stwierdzone wnioski.