

## CLUSTERING BASED BIBLIOMETRIC ANALYSIS OF THE BUSINESS PERFORMANCE CONCEPT

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### **Abstract**

*Business performance, as a whole, represents the main concern for financial information users, as a risk assessment tool meant to establish the effectiveness and efficiency of the work performed. Over time, there was an ongoing challenge related to business performance analysis. The purpose of this research is to identify and examine the interdependency relations between the determining factors in the bibliometric analysis of the published literature, when the main topic is business performance. Therefore, to reach this purpose we pursued the following objectives: O1- bibliometric coupling analysis of the scientific papers published on the Web of Sciences and Scopus databases, which addressed the business performance topic by means of clustering; O2 – identifying the correlations between research projects already in place and highlighting research projects not yet approached by researchers, creating new research niches, impacting the development of the performance model applied to current demands.*

### **Keywords**

performance, research field, bibliometrics, bibliographic coupling analysis.

### **JEL Classification**

M40

### **Introduction**

Academic journals have an important role in disseminating results and knowledge among stakeholders. According to Morgan (1985), academic journals have a significant role, as they legitimize and control „the nature of what needs to be considered as valid research”. Thus, for many researchers (for example, Hu and collab. 2013; Leonidou and collab. 2010; Malhotra and collab. 2005; Nel et al. 2011, Melega, 2022) the review of papers published in academic and conference journals represents a significant research project, highlighting and making a full use of the scientific production in various fields of research. The majority of bibliometric analyses are based on content analysis, which represents, according to Yale and Gilly (1988), „the most valid way of determining the editor’s/ reviewer’s preference”. Bibliometric studies contribute to the identification and establishment of research niches, for the purpose of outlining and predicting new research niches, which were either underexplored or not explored at all.

Following on from that, to achieve the bibliometry of scientific papers whose research topic is centered on business performance, environment performance, economic performance and global performance, we analyzed the scientific literature in the Web of Sciences and Scopus databases, while using Vosviewer and SPSS softwares as analysis tools.

**Table 1. Key concepts and number of scientific papers published in the Web of Science and Scopus databases**

Key concepts searched on Web of Science	Research results	Key concepts searched on Scopus	Research results	Total
Business performance	69.471	Business performance	2.471	71.942

Source: prepared by the author

According to the data in Table 1.1, we can easily notice that the number of papers focusing in their research on business performance in the two databases, Web of Science and Scopus, is quite significant, especially when looking at Web of Science with about 69,471 papers. The large number of publications in the Web of Science database is due to the fact that this is one of the largest databases globally, covering more than 12,200 scientific journals and 160,000 conferences for which the ISI index is being calculated.

### Literature review

Businesses are the engine of the economy, their main purpose being to reach a maximum level of performance by achieving the objectives established. Business performance refers to its management's effectiveness and efficiency in using resources to reach the objectives established. So, a high-performance company is a company who succeeds in reaching its goals, at minimum cost, without wasting resources. Each entity establishes its own performance assessment indications. National and international regulations require entities to disclose in the notes to financial statements certain financial performance indicators, such as: liquidity, solvency, cost-efficiency, etc. Stakeholders, comprising: creditors, investors, managers, staff, etc. have a special interest in the financial performance of the entity. Each group has its own interest in considering the financial performance of a business.

In our scientific endeavor, for a better knowledge of the general trends within the scientific papers and also to identify the relevance of the studies centered on "business performance", we have set out the meta-analysis below, in Table 2. According to Mullen (1989), regular review and meta-analysis comprise significant advantages related to "accuracy", „objectivity" and "replicability", compared to narrative review. To carry out the meta-analysis, we selected the most relevant papers of the Web of Science database, using as a research filter the number of citations and paper relevance.

**Table 2. Summary of impact studies in the researched field**

Author/ authors	Year of publication	Research purpose and results	Research timeliness and impact
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Yang, C.C.	2012	The purpose of the research is to examine the impact of environmental management on business environmental performance and, in general, of the performance of Taiwan shipping companies. Based on factors analysis, the author identified three critical dimensions of environmental management: environmental management practices, environmental management audit and investment in environmental management. To examine the effects of environmental management on environmental performance and business performance, the author developed a structural equation model (SEM). Results showed that environmental management had significant positive effects on environmental performance and on business performance, however, environmental performance showed no relation to business performance.	This research has a high impact, proven by the number of citations: 15 citations in Web of Science and 17 citations in other databases. Also, based on relevance, after applying this filter, the paper was ranked the first "Highly cited" <sup>1</sup>
Hung, K. P., Chou, C.	2013	Researchers examined the direct effects of acquiring and exploiting external technology on business performance. A questionnaire was used as an analysis tool, which was sent to 176 high-tech manufacturing companies in Taiwan. The research results showed that the purchase of external technology has a positive impact on companies' performance, while the contrary happens when exploiting external	The paper has a high impact, given the relevance of the topic. The accelerated digitization process, that can be noticed lately, affects entity's sustainability. The timeliness and relevance of the paper is also due to the number of citations: 178 in Web of Science and 11 in other databases. "Highly cited"

<sup>1</sup> "Highly cited" –Beginning with March / April 2021, this ranking is granted to papers and publications who obtained enough citations to place them on the top 1% in the academic field of social sciences, generated based on a threshold of citations per field and year of publication.

		technology. This study also shows that the purchase of external technology enhances the relation between external technology exploitation and business performance.	
Camison, C., Villar-Lopez, A	2014	Authors examined the relation between business innovation and technology innovation capabilities and their effect on entity's performance. They conducted a survey on 144 industry companies in Spain, modelling a system of structural equations. Results revealed that business innovation favors the enhanced technology innovation capacity of the company and that both business innovation, as well as technological capacities related to products and processes can lead to higher business performance.	The relevance of the paper is given by the timeliness of the topic, namely „technology innovation”. We also need to outline that the paper has a citation index of 365 in Web of Science and 431 in Scopus. <i>”Highly cited”</i>
Saeidi, S.P., Sofian, S., Saeidi, P., Saeidi, S.P., Saeidi, S.A.	2015	Researchers examined the relation between corporate social responsibility (CSR) and business performance. The authors consider sustainable competitive advantage, reputation and clients' satisfaction as three significant mediators in the relation between CSR and business performance. The results related to 205 manufacturing and consumer products companies in Iran show that there is an entirely mediated relation between CSR and business performance. The positive effect of CSR on business performance is due to the positive effect of CSR on competitive advantage, reputation and clients' satisfaction.	According to the citation index, this paper has 459 citations in Web of Science and 522 in Scopus. <i>”Highly cited”</i>

Inkinen, H.	2016	Authors examined the literature in the field that approached the view that management practices impact business performance. At the time of publication, this was the first rigorous review of the literature on KM practices and business performance. That study highlights that entities should give consideration to specific KM management skills and business agreements to obtain sound performance. Authors also mention that specific management attributes and business agreements are susceptible of supporting business performance by a more effective and efficient use of resources.	The relevance of the paper is given by the number of citations in Web of Science – 121 citations, thus obtaining the „Highly cited” badge.
Lins, K.V., Servaes, H., Tamayo, A.	2017	Researchers examined the effects of CSR activities on business performance, in the context of the economic crisis of 2008-2009. They noticed that the increase of social capital resulted from the CSR activities is important in times when confidence in corporations decreased and that, under normal circumstances, any social capital benefits are already deducted from an entity’s share price. In the same time, authors are of the opinion that social capital, besides financial capital, can be a decisive factor of business performance.	The paper has a number of 445 citations in Web of Science and a very high reference -„Highly cited”.
Kim, K.H., Kim, M.,Qian, C.L	2018	Authors examined the relation between corporate social responsibility and business performance from the competitive point of view. By analyzing the reports of 113 US	According to the citation index, the paper was cited 95 times in the Web of Science database. „Highly cited”.

		companies, they reached the conclusion that CSR activities have a positive influence on business performance, namely on financial performance, when the company is conducting a high number of competitive actions.	
Aydiner, A.S., Tatoglu, E., Bayraktar, E., Zaim, S., Delen, D.	2019	Taking into account the fundamentals of the view oriented towards resources, authors examined the effects of BA (business analytics) adoption on the performance of business processes. Based on the data collected from 204 medium and high level business directors across various industries, the results of this empirical study show that BA adoption has a positive effect on the business process performance.	According to the citation index, the paper has 48 citations in Web of Science and 57 in Scopus. - „Highly cited”.
Huayu Shen, Mengyao Fu, Hongyu Pan, Zhongfu Yu & Yongquan Chen	2020	The purpose of this paper is to analyze the COVID-19 impact on the outcomes of listed Chinese companies. The results of the study showed that business performance is negatively impacted by the COVID-19 pandemics. This negative impact on business performance is more significant when the investment scale or the sales revenues of a company are lower. Business performance is affected by crisis situations. Managers tend to postpone investments when risks are increasing or in times of uncertainty, thus the momentum of business sustainability is affected.	The study is extremely relevant since it is one of the first publications to have associated COVID-19 pandemics with business performance. Following the use of the ”relevance” filter in Web of Science, this paper took the first place, with a number of 86 citations. ” <i>Highly cited</i> ”

Wang, Z.N., Cai, S.H., Liang, H.G., Wang, N.X., Xiang, E.W.	2021	The purpose of this study is to explore the influence of intellectual capital (IC) on business performance, taking into account the mediating role of innovation speed and quality. Results show that human capital, structural capital and relational capital, are positively related to innovation speed and quality, which, in turn, facilitate the operational and financial performance of a company.	Since it is one of the first studies to have investigated the way in which IC is able to influence business performance by the mediating effects of innovation speed and quality, this study not only contributes to the HDM literature on IC and innovation, but also offers managers information on how to align their HRM strategies and practices to develop IC when targeting innovation and performance outcomes. According to the citation index of Web of Science, the paper was cited 73 times. <i>"Highly cited"</i>
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Source: prepared by the author

Performance is an evanescent concept, since it takes over various meanings in various contexts, even within the same company. From the lexicographic point of view, the term of performance has its origins in Latin from the word „performare”, being taken over in French as „performance” which means „to accomplish, to execute”. The term was taken over in English, with the same meaning „to perform”. The Explanatory Dictionary of the Romanian Language defines performance as „an outstanding achievement in a field of activity” or „a very good, exceptional and valuable result”. Therefore, business performance actually relates to the company’s results within a reference period. In the economic practice, the term of „performance” was assigned a series of definitions, considered in the light of three dimensions:

- The achievement of the established objectives;
- The value created by the entity;
- The efficiency and productivity of the entity.

In the opinion of the authors Albu and Albu (2005) „the notion of performance has an abstract character, and its definition is many times related to other concepts: effectiveness, efficiency and value”.

Some authors define performance from the perspective of created value, for example Stern, Shiely and Ross (2001) consider it „an uncertain level of a business potential, obtained following the enhancement of the value-cost relation and which renders the entity competitive in certain strategic areas”. The definition of performance in a dependency relation to the value created is also supported by Lorino (1995), who states that „performance represents for a business what contributes to the improvement of the value-cost couple and not only what contributes to cost reduction and value increase”. In other words, business performance is its capacity to create value at a minimum cost. In the end, financial performance seen by virtue of value creation can be attributed to publicly listed companies. For publicly listed companies, value creation is an important condition for stakeholders, outlining their economic stability. Performance reflects the business capacity to generate operational cash flows, a condition on which economic stability is based in order to create value for shareholders.

Depending on business productivity and efficiency, according to Niculescu (2003) „an entity is, in theory, performing if it is productive and efficient, in the same time”. Some authors, for example Imbrescu and Hațegan (2011) state that performance cannot be

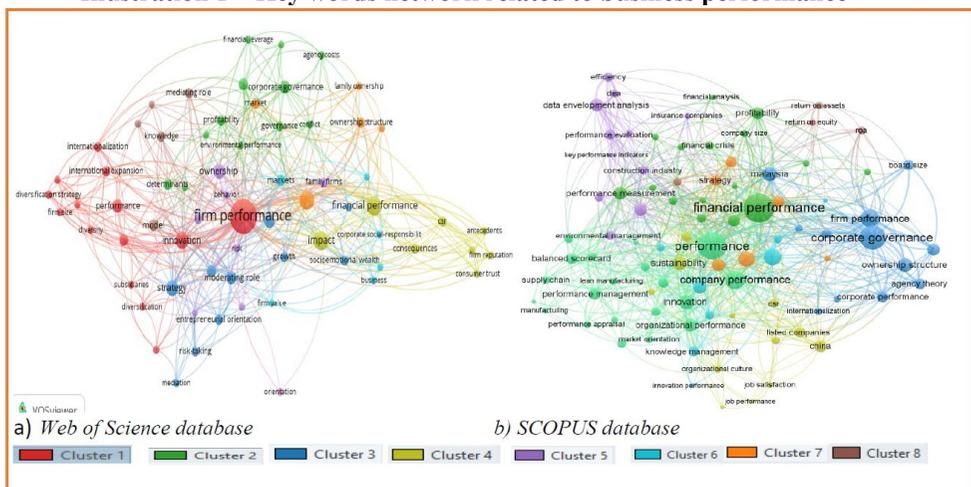
considered solely in terms of productivity and efficiency, since „efficiency can express performance (when the report is greater than one), and productivity can also describe the production work of an entity which may be non-performing”.

Other authors define performance from the perspective of achieving objectives. Bourgulnon (1995) opinions that „the one achieving their objectives is performing”. However these approaches, to analyse business performance from the point of view of achieving predefined goals, can represent a subjective assessment, since every entity has its own set of goals and their achievement might to be seen as a performance by some shareholders. For example, the entity X sets a goal to make a 1 million USD profit during the financial year; by referring to the definition of performance, considered based on the goals achieved, we can say the entity fulfilled its level of performance by the achievement of its goal. But, from my point of view, this is not right since, when assessing business performance based on the level of goals achievement, we also need to assess resource consumption or business sacrifice involved in their achievement. Also, the goals need to be correlated and reported to the competitors’ or market level, taking into account business size and industry. According to Lebas (1995), the definition of performance by assessing the achievement of the goals „is incomplete, since it is limited to the definition to performance characteristics, without looking for an operational means”. In conclusion, a less exhaustive definition of performance, depending on the objectives achieved, can be the following: the effectiveness with which the business is managing its resources for the purpose of achieving its predefined goals.

### Results and discussions

As mentioned before, business performance, as a whole, represents the main concern for financial information users, representing a risk assessment tool meant to establish the effectiveness and efficiency of the work performed. Over time, there has been an ongoing concern to assess business performance. Thus, to get a glimpse of the main research trends on business performance, with the help of VOSviewer we examined the key words in the abstracts of 69.471 papers published on the Web of Science platform and 2.471 papers in the SCOPUS database (see Illustration 1.1) concerning business performance.

**Illustration 1 – Key words network related to business performance**



Sursa: prepared by the author by using VOSviewer

The Illustration 1 shows 8 interdependent groups (clusters), focused on the study of business financial performance. The image in Illustration 1 confirms that the groups of topics which are part of the clusters 1-6 cover relatively independent topics of the literature. The largest number of key words approach relations set out in the Illustration are between publications belonging to the same cluster. Moreover, the Illustration shows us that the groups 1, 2, 3, 4, 5 and 6 (illustrated in red, green, light and dark blue and purple) are more strongly connected than the other groups. Out of the 8 groups, the groups 7 and 8 (marked with yellow) seem to be the most independent.

Considering that scientific production is influenced by correlations between key terms, their frequency, as well as their citation number in scientific publications, based on the data provided by the Vosviewer software, we developed an econometric model, allowing us to identify correlations between the already existing research trends and to highlight the research topics that were not approached.

$$TL = \alpha + \beta_1 \text{ cluster} + \beta_2 L + \beta_3 O + \beta_4 NC, \text{ where}$$

- TL - Total links;
- L – Links;
- O – Occurrences;
- NC – Standardized number of citations.

Total links or the total power of the link sets out the number of publications when the two words appear. The variable link outlines to co-occurrence connections between the two key words. According to the VOSviewer manual, each link has a power, represented by a positive numerical value. The greater this value, the stronger is the link. The occurrence variable outlines the number of articles where the key words appears or their frequency. The standardized number of citations represents the citation number of the document divided by the average citation number of all the documents published in the same year and included in the databases used by VOSviewer. The standardization has a correction feature, since older documents had more time available to be cited compared to more recent documents.

**Table 3. Correlations related to Total links and links, cluster, occurrence, citation number**

		TL	cluster	L	O	NC
Pearson Correlation	TL	1.000	-.140	.996	.955	.075
	cluster	-.140	1.000	-.138	-.098	.077
	L	.996	-.138	1.000	.940	.089
	O	.955	-.098	.940	1.000	.004
	NC	.075	.077	.089	.004	1.000
Sig. (1-tailed)	TL	.	.006	.000	.000	.091
	cluster	.006	.	.007	.040	.086
	L	.000	.007	.	.000	.056
	O	.000	.040	.000	.	.471
	NC	.091	.086	.056	.471	.
N	TL	319	319	319	319	319
	cluster	319	319	319	319	319
	L	319	319	319	319	319
	O	319	319	319	319	319
	NC	319	319	319	319	319

Source: prepared by the author by using IBM SPSS Statistics, version 26

According to the data in Table 3., in terms of correlations between the key terms examined from the two databases (Web of Science and Scopus) we can notice that there is a very strong correlation between the TL variable (total links) and the L (links) and O (occurrence) variables, in the amount of 0,997 and respectively 0,897. In other words, the total number of links between key words is influenced by the frequency of their occurrence within publications and also by the links they generate within and outside the cluster. In contrast with what was previously stated, we can notice, based on the data in Table 3, a weak correlation between Total Links and the number of citations and cluster variables, in the amount of 0,090 and -0,186, which highlights that many publications are centered around the same key terms which do not create other variables to form other clusters, namely other research niches.

**Table 4. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.998 <sup>a</sup>	.996	.996	1.342	1.873
a. Predictors: (Constant), NC, O, cluster, L					
b. Dependent Variable: TL					

Source: prepared by the author using IBM SPSS Statistics, version 26

R-squared, according to the data in Table 4 has a value of 0.996 which explains the strong relation between the dependent variable Total links and the independent variables NC, O, cluster and Links. The variation of independent variables NC, O, cluster and Links, their increase or decrease implicitly implies the variation of the dependent variable Total Links. The strong link between variables can be explained by the fact that the total number of key word links is generated by the their frequency of apparition, as well as by the number of clusters creating new links, that is new research niches which were not highlighted or were less exploited.

**Table 5. Regression coefficients**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.570	.188		-13.661	.000
	cluster	-.031	.017	-.007	-1.895	.059
	L	1.080	.014	.844	75.295	.000
	O	1.811	.125	.161	14.486	.000
	NC	-.010	.078	.000	-.127	.899
a. Dependent Variable: TL						

Source: prepared by the author using IBM SPSS Statistics, version 26

The estimated equation of the multiple linear regression model, consistent with the coefficients of the model in the table, is the following:

$$TL = -2,570 - 0,031 \text{ cluster} + 1,080 L + 1,811 O - 0,010 NC$$

According to the data in Table 1.4, the number of total links is greatly influenced by occurrence, followed by links, the standardized number of citations and clusters. If we consider this from the logical point of view, the number of key word apparitions in other papers creates new links which implicitly lead to an increase in the cluster number and the number of publications where two key words appear together (total links). The increase in the standardized number of citations leads to an increase in the cluster

number, which can imply new research niches (emerging topics) moving away from the old network and developing a new one, usually an independent one or, in very rare cases, one having few connections with the neighboring clusters. This causes a decrease in the number of total links, since the development of a new cluster deliberately leads to the breaking down of the network by the creation of a new one, of enhanced interest or more up to date, consisting of an emerging topic.

**Table 6. Residuals Statistics<sup>a</sup>**

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.96	183.52	18.20	20.598	319
Residual	-10.163	4.542	.000	1.334	319
Std. Predicted Value	-.837	8.026	.000	1.000	319
Std. Residual	-7.573	3.385	.000	.994	319
a. Dependent Variable: TL					

Source: prepared by the author using IBM SPSS Statistics, version 26

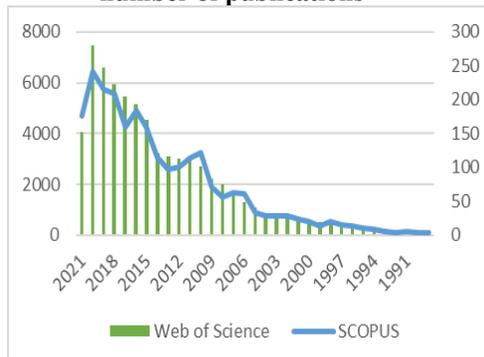
By applying residual statistics we identified the topics, or the subjects which do not fit the model, more precisely which have been largely considered and exploited in the research literature: performance, dynamic performance, performance ratings, reliability. In other words, a significant part of the scientific production orbits around these key terms, which are no longer relevant. The following research topics were identified, that continue to fit the model: business, differentiation, empirical-examination, profitability. In practice, future research on business performance shall orbit around the terms mentioned before, as they stand for subjects which were less exploited, either because of their lack of relevance or because they were simply overlooked by researchers.

In terms of research literature characteristics, most research studies conducted between 1976-2021, covered areas such as: management (36.782 papers), economics (15.425 papers), finances (12.164 papers) and business (30.236 papers).

**Illustration 2 – Research literature profile based on research areas**



**Illustration 3 – Global evolution of the number of publications**



Source: Web of Science – Result Analysis ([www.apps-webofknowledge-com](http://www.apps-webofknowledge-com))  
Scopus - Result Analysis (<https://www-scopus-com>)

The scientific record comprises a large number of papers addressing the study of business performance. It should be noted that most of the researchers mainly focus on the numerical study of performance indexes (value), especially of the financial performance, overlooking the factors affecting this performance.

## Conclusions

Based on the bibliometric analysis, we can conclude that the majority of the studies focus on the analysis and assessment of business performance, more specifically on: economic performance, social performance and environmental performance. Most of the publications relied on qualitative type research methods, usually on the definition of the concept and of the determining factors. It is also necessary to clarify that, until now, no general model of assessing global business performance was identified, except for the integrated reporting which aims at constituting an integration model of financial and non-financial business outcomes.

The evaluation and measurement of business performance is a complex process, which primarily requires the assessment of determining factors and of the environment in which the business carries out its activity. Studies and research literature illustrate that business performance is influenced by a series of factors such as: the economic state of the country (Ntim, 2009); corporate governance practices (Reddy, 2010; Chugh, Meador, Kumar, 2009); business characteristics, in particular: size (Love, Rachinsky, 2007); growth rate, dividends, liquidity (Gurbuz, Aybars, Kutlu, 2010); sales level (Forbes, 2002); leverage, exports, location, size and efficient management significantly affected business performance (Panagiotis and Konstantinos, 2008). In this regard, we put forward the idea that it is imperative, when assessing/ measuring the performance of a business, for the factors previously stated to be taken into consideration. We also note that this procedure is required especially when a comparison between businesses is carried out, businesses coming from two completely different backgrounds. By ignoring the analysis of the factors having determined business performance, the report obtained will practically distort reality.

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