Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 182 (2017) 412 – 417

Procedia Engineering

www.elsevier.com/locate/procedia

7th International Conference on Engineering, Project, and Production Management

Corporate Social Responsibility in the Light of Management Science – Bibliometric Analysis

Agata Lulewicz-Sas*

Faculty of Management, Bialystok University of Technology, Wiejska 45A, 15-351 Bialystok, Poland

Abstract

At each stage of the development of scientific research, it is necessary to know the potential areas of this research, and their severity. The tool enabling their understanding is the bibliometric technique, which in relation to scientific research is defined as the quantitative analysis (using mathematical and statistical methods) of publications focused on the implementation of information functions regarding the development of the research area. The aim of this article is to present the results of the bibliometric analysis of scientific research on the concept of corporate social responsibility. The analysis was performed with the use of the VOSviewer software, as well as the data analysis tool available in the Web of Science base.

Peer-review under responsibility of the organizing committee of EPPM2016

Keywords: corporate social responsibility; research areas; bibliometric analysis

1. Introduction

At each stage of the development of scientific research, it is necessary to know the potential areas of this research, and its severity. The tool enabling their understanding is the bibliometric technique, which in relation to scientific research is defined as the quantitative analysis (using mathematical and statistical methods) of publications focused on the implementation of information functions concerning the development of the research area [1, 2].

Bibliometric analysis [12] can be used to identify the research areas within the concept of corporate social responsibility. Particularly useful in this case is the technique based on the analysis of the co-occurrence of words (called Co-word analysis) in the analysed text (primarily in scientific publications), [3]. This technique can be applied

* Corresponding author. Tel.: +4-885-746-7465; fax: +4-885-663-1988.
E-mail address: a.lulewicz@pb.edu.pl

Peer-review under responsibility of the organizing committee of EPPM2016
doi:10.1016/j.proeng.2017.03.124

at the level of titles, keyword lists, summaries of publications, or even entire contents (the entire record), [4]. The co-occurrence of words cannot only indicate the existence of areas/sub-areas of research, but also can be used to identify the directions for further development of the research area [5]. The analysis was performed with the use of the VOSviewer software, as well as the data analysis tool available in the Web of Science base databases.

This article presents the results of the bibliometric analysis of the scientific research regarding the concept of corporate responsibility, and in particular the presentation of maps of the relationship between keywords, maps of clusters of research areas, as well as the maps of the density of keyword citations.

2. Research method

This study analysed the scientific texts included in the Web of Science TMCore Collection bibliographic database. The analysis of the co-occurrence of words was performed with the use of the VOSviewer software, (Visualizing Scientific Landscapes), version 1.6.1. of March 16 2015, developed by the Leiden University Centre for Science base and Technology Studies in the Netherlands. The software is based on an algorithm called "visualization of similarities" or VOS [2] and provides a graphical representation of the bibliometric networks, and in particular, enables the mapping of the relationship between keywords, indication of the most common terms in the defined description of a bibliographic record, highlighting the cluster groups of the analysed concepts, mapping the intensity of the citations of the highlighted concepts [6, 7].

Bibliometric analysis identifying the areas of research within the concept of corporate social responsibility took place in three stages shown in Figure 1.

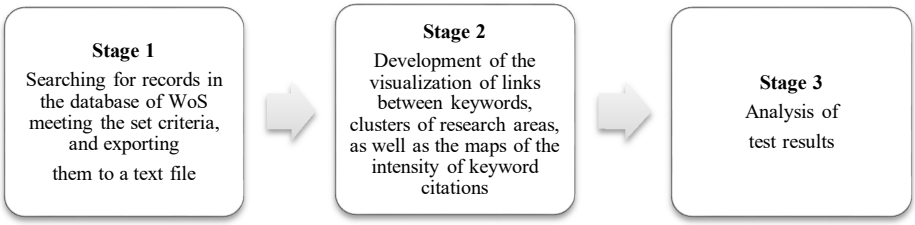

Fig. 1. Stages of bibliometric analysis used to identify research areas within the concept of corporate social responsibility. Source: [8].

Stage 1 included a search for records in the Web of Science TMCore Collection database. The search was narrowed down to two criteria, namely: the period of publications, (the analysis covered the period from 2010 to 08.07.2015) and the keywords in the article title or as the topic of the article (search words are: "corporate social responsibility", "CSR"). The result of the database search was the identification of 7069 publications meeting the accepted criteria. The records with their full descriptions (author, title, and source, abstract) were exported to a text file.

The purpose of stage 2 was to prepare visualization (map) of links between thematic areas. The visualization was prepared with the use of the VOSviewer software by importing a text file with the records deriving from the Web of Science TMCore Collection database. The process of generating maps begins with the extraction of keywords, the repeatability of which in bibliographic descriptions is at the level of at least 100 (software for this purpose utilizes the method of Binary Counting). As a result of the extraction process, 90,955 keywords were found. As many as 2,290 words occurred at least 10 times. Due to the number of keywords, the range of words has been limited for concepts the incidence of which amounted to at least 100 times. 241 keywords were selected this way. The words that are not substantially related to the research area of CSR, such survey, aim, issue, number were eliminated from the catalogue of proposed words. On the basis of the prepared database it was possible to develop a map of links between keywords, map of clusters of research areas, and a map the intensity of citations of the analysed concepts.

Stage 3 is the analysis of the results obtained during the test procedure.

The determination of interrelationships between the highlighted keywords took place according to the following formulas [9, 10]:

$$P(A|B)=\sum_{i=1}^{n} p\ (A|B) \tag{1}$$

$$p_i(A|B)=\begin{cases}1 \text{ gdy } A \in art_i \ \wedge B \in art_i \\ 0 \text{ gdy } A \notin art_i \ \vee \ B \notin art_i\end{cases} \tag{2}$$

where:

P(A|B) – summary link between the selected pair of keywords (A and B)
(A|B) – individual link between the selected pair of keywords (A and B)
n – number of the analyzed keywords
i – number of scientific articles (i = 1, 2, …, n)
A,B – individual keywords
art_i – set of keywords that characterize a given scientific text (keyword search was narrowed down to the period from 2010 until 2015, as well as the search fields "*topic*" and "*title*").

3. Research results

As a result of the adopted research procedure, it was possible to present a map of links between the keywords concerning corporate social responsibility (Fig. 2).

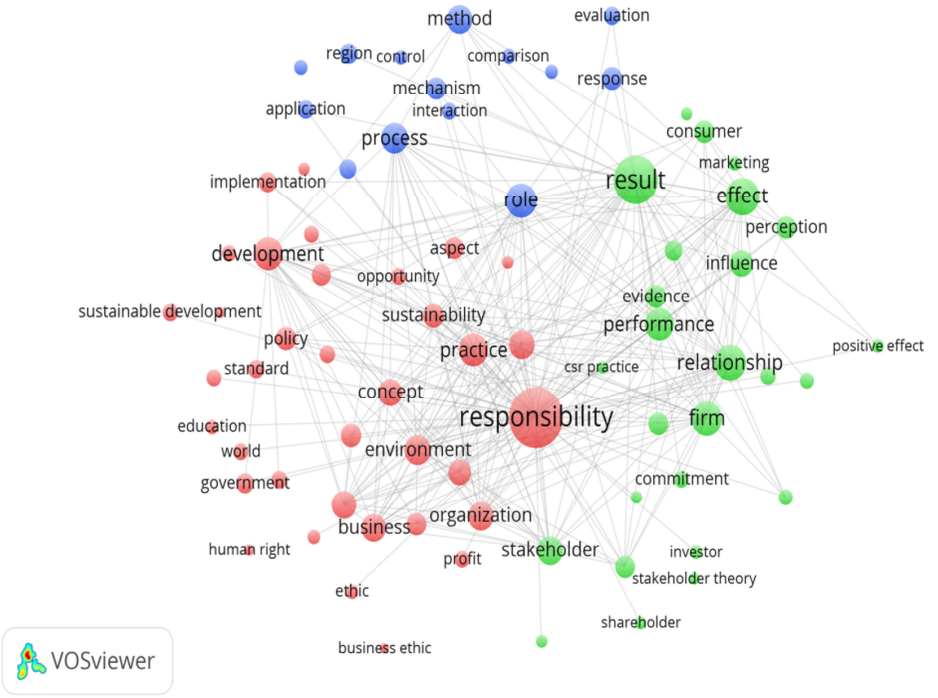

Fig. 2. Map of links between keywords.

Due to the clarity of the information, network visualisation was used, which provides information about the incidence of co-occurrence of keywords in form of a suitable arrangement of elements on a plane. The size and clarity

of the label of a given element suggests its incidence in the analysed set. On the other hand, the proximity of the position of the elements indicates the more frequent co-occurrence of keywords in specific collections. Elements located on the edges of the visualization are characterized by a small number of links between them, and the central location means strong relationships with a more numerous and more diverse group of other keywords [9, 11, 12].

The used test procedure made it possible to isolate three research clusters (research areas) within the concept of corporate social responsibility and to show the interconnections between them (Fig. 3).

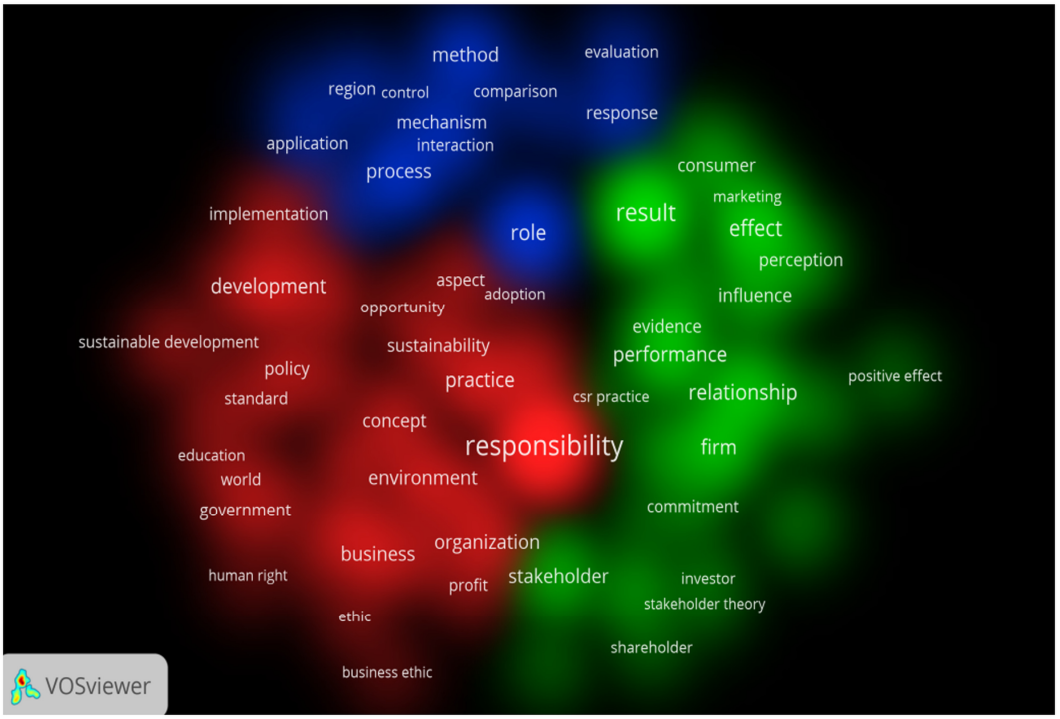

Fig. 3. Map of clusters of research areas.

In the central part of the map, there is the strongest cluster (marked in red) associated with the issue of responsibility. This cluster is linked to the largest group of keywords. The most popular keywords within this cluster are: Development, Practice, and the Environment.

The second of the identified research clusters (indicated in green) is focused on the issue of the results related to the implementation of the concept of corporate social responsibility. The most common keywords within the cluster include the Effect, Relationship, and Performance.

The third research cluster (marked in blue) revolves around the issue of the importance of the concept of corporate social responsibility (Role). Keywords included in this cluster are primarily the process, the method, the response, the mechanism, and evaluation.

The map of the density of keywords citations, resulting from the adopted research procedure, is shown in Figure 4.

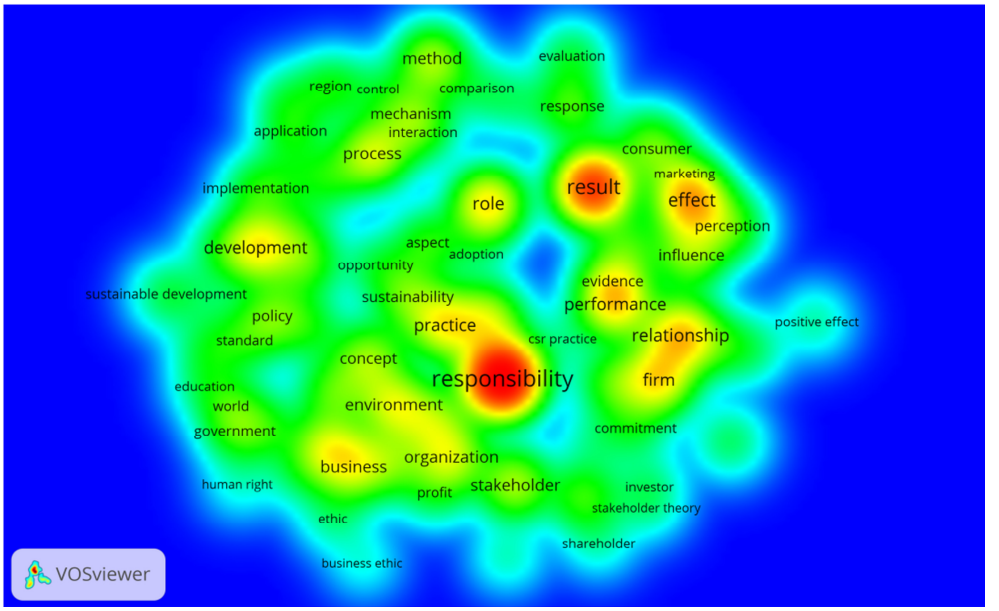

Fig. 4. Map of the density of citations of the analysed keywords.

The map of the density of citations shows that the most frequently cited concepts in the bibliographic description were: responsibility, results, effects, performance, and relationship.

4. Conclusion

The bibliometric analysis (map of the links between the keywords, the map clusters of research areas, map of the density of citations of the analysed keywords) shows that an important area of research in the field of corporate social responsibility is the results of the implementation of this concept. For these results to constitute a reliable source of information for the interested parties (stakeholders), they must be subjected to a process of measurement.

The measurement of socially responsible activities is one of the most important and difficult problem [13–15] areas undertaken in the field of management science. Problems in the field of measurement are mainly due to the complexity of the issue of corporate social responsibility and the lack of clear definition and interpretation of this issue. They have already identified a number of ways to measure socially responsible activities, depending on the adopted perspective and research methodology. The measurement methods described in the literature are not without their limitations, and the problems of credibility and reliability of the measurement results of socially responsible activities are raised more and more frequently in literature on the subject.

Acknowledgements

Article was financed from means of National Science Centre allocated on the basis of the decision DEC-2011/01/D/HS4/05665.

Ministry of Science and Higher Education
Republic of Poland

7th International Conference on Engineering, Project, and Production Management (EPPM2016) was financed in the framework of the contract no. 712/P-DUN/2016 by the Ministry of Science and Higher Education from the funds earmarked for the public understanding of science initiatives.

7th International Conference on Engineering, Project, and Production Management (EPPM2016) finansowana w ramach umowy 712/P-DUN/2016 ze środków Ministra Nauki i Szkolnictwa Wyższego przeznaczonych na działalność upowszechniającą naukę.

7th International Conference on Engineering, Project, and Production Management (EPPM2016) was co-organised by the Agency for Restructuring and Modernisation of Agriculture (Poland).

References

[1] Ejdys J. Problematyka społecznej odpowiedzialności biznesu jako obiekt naukowych zainteresowań – wyniki analizy bibliometrycznej. *Przegląd Organizacji* 2016;4:36–44.

[2] Sarkar S, Searcy C. Zeitgeist or chameleon? A quantitative analysis of CSR definitions. *Journal of Cleaner Production* 2016;135:1423–1435.

[3] Benavides-Velasco CA, Quintana-García C, Guzmán-Parra VF. Trends in family business research. *Small Business Economics* 2013;40:41–57.

[4] Klincewicz K, Żemigała M, Mijak M. *Bibliometria w zarządzaniu technologiami i badaniami naukowymi* [Bibliometry in technology management and scientific research]. Warszawa: Ministerstwo Nauki i Szkolnictwa Wyższego; 2012.

[5] Dobrzyński MD, Dziekoński K, Jurczuk J. Analiza bibliometryczna artykułów w „Gospodarce Materiałowej i Logistyce" z lat 2010–2012 [Bibliometric analysis of articles in „Materials Management and Logistics" in the years 2010-2012]. *Gospodarka Materiałowa i Logistyka* 2013;12:24–29.

[6] Moed HF. Measuring Contextual Citation Impact of Scientific Journal. *Journal of Informetrics* 2010;4:265–277.

[7] Zhu S, Takigawa I, Zeng J, Mamitsuka H. Field Independent Probabilistic Model for Clustering Multi-field Documents. *Information Processing an Management* 2009;45(5):555–570.

[8] Lulewicz-Sas A. *Ewaluacja społecznie odpowiedzialnej działalności przedsiębiorstw* [Evaluation of socially responsible activity of enterprises]. Białystok: Oficyna Wydawnicza Politechniki Białostockiej; 2016.

[9] Gudanowska AE. Tworzenie mapy wiedzy opartej na tematyce projektów badawczo – rozwojowych na przykładzie województwa podlaskiego [Creating knowledge maps based on the themes of R&D projects on the example of the Podlaskie region]. *Ekonomia i Zarządzanie* 2015;7(1):257–270.

[10] van Eck NJ, Waltman L, Dekker R, van der Berg J. A comparison of Two Techniques for Bibliometric Mapping: Multidimensional Scaling and VOS. *Journal of the American Society for Information Science and Technology* 2010; 61(12):2405–2416.

[11] Waaijer CJF, van Bochove CA, van Eck NJ. On the map: Nature and Science editorials. *Scientometrics* 2011;86(1):99–112.

[12] Prichard A. Statistical bibliography or bibliometrics? *Journal of Documentation* 1969;25:348–349.

[13] Carroll AB. A Commentary and an Overview of Key Questions on Corporate Social Performance Measurement. *Business & Society* 2000;39 (4):466–478.

[14] Gjølberg M. Measuring the immeasurable? Constructing an index of CSR practices and CSR performance in 20 countries. *Scandinavian Journal of Management* 2009;25:10–22.

[15] Abbott WF, Monsen R. On the measurement of corporate social responsibility: Self-reported disclosure as method of measuring of corporate social involvement. *Academy of Management Review* 1979;22(3):501–515.