THE PROGRESS AND ADVANCEMENT OF THE BUSINESS PERFORMANCE MEASUREMENT RESEARCH

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Abstract

Purpose – The purpose of this paper is to review extant literature in the field of performance measurement. The analysis covers study trends and development of scientific research on performance measurement as well as reveal resources with high impact

Design/methodology/approach – The study consists of a systematic review of peer-reviewed articles conducted for ten-year period 2009-2018 This paper provides an update of Neely's work ''The evolution of performance measurement research'' and Paolo Taticchi, Flavio Tonelli and Luca Cagnazzo "Performance measurement and management: a literature review and a research agenda". Citation/co-citation analysis has been used to explore ''performance measurement'' (PM) literature, while a chronological review or science mapping of main frameworks is presented to explore developments in the field globally. The applied investigation methods were chosen based on the analysis of existing scientometric data: the number and dynamics of published documents; their subject area and type; source title; territory/country; affiliation; authors; h-index, etc.

Findings – The paper carries out the most cited works and mappes them on a timeline that indicates the years of the greatest research activity. It crystallizes the research activities in the field and highlights the main dimensions and sub-dimensions. The research identifies the key authors based on a citation/co-citation analysis and sheds the light on ever green as well as promising directionsfor the further research.

Research limitations/implications – The analysis was undertaken within the field covering representative pool of existing peer-reviewed articles for bibliometric analysis. The research scope is limited to performance measurement.

Originality/value – Study provides the timescale and frameworks' characteristics identified. By aggregating and systematization the business performance measurement frameworks covered, the paper might be of great interest to scholars and practitioners interested in the updates on the literature evolution and in identifying future areas of research.

Keywords: *business performance management, performance measurement, bibliometric analysis, science mapping*

1. INTRODUCTION

Since 1956 when R.M. Ridgway has published a paper entitled "Dysfunctional Consequences of Measurement" the gate to performance measurement world was open. Throught the 80s, 90s and 00s the expansion of the performance measurement systems has resulted in extensive volume of the research papers and guidelines on the practitioners' side.

Reaching the critical stage when the he first conclusions could be made the researchers investigated the literature on the performance measurement. "Performance measurement system design: A literature review and research agenda" by Neely et al. was first published in 1995. Measurement has been recognized as a crucial element to improve business performance (Sharma et al.,2005) and as a consequence interest on the performance measurement and management (PMM) has notably increased (Taticchi (2008), Taticchi (2012)).

2. DATA AND METHODS

The dataset used in this paper was constructed using the Scopus database. Every publication that contained the phrase "performance measurement" in its title, keywords or abstract was identified and downloaded. The search was limited to subject area Business, Management and Accounting. The research was conducted in April 2019; therefore, the year of publication was limited up to 2018. The research covered the period 2009-2018 continuing the research by Neely (2005) and Taticchi (2008, 2012).

The authors have analyzed the overall trends, key words, classified articles by subject area, by discipline, by country and by the authors. Next step was citation and co-citations analysis.

3. RESULTS

The authors have analyzed the increase in the number of the published documents in the field of the performance measurement. The results are shown in Figure 1. The upward steady growth can be clearly observed. The number of the documents has slightly increased in eighties and the growth rate goes up in nineties reaching 93 documents in year 1999. Accelerated growth can be observed in 90st and especially in starting 2000 reaching its maximum of 377 documents published in 2016. Slight decrease to 355 in year 2017 and 325 in year 2018 can be explained by the fact that data for this research has been collected in April 2019 and the authors allows for the possibility all the documents for 2018 have not yet been indexed.

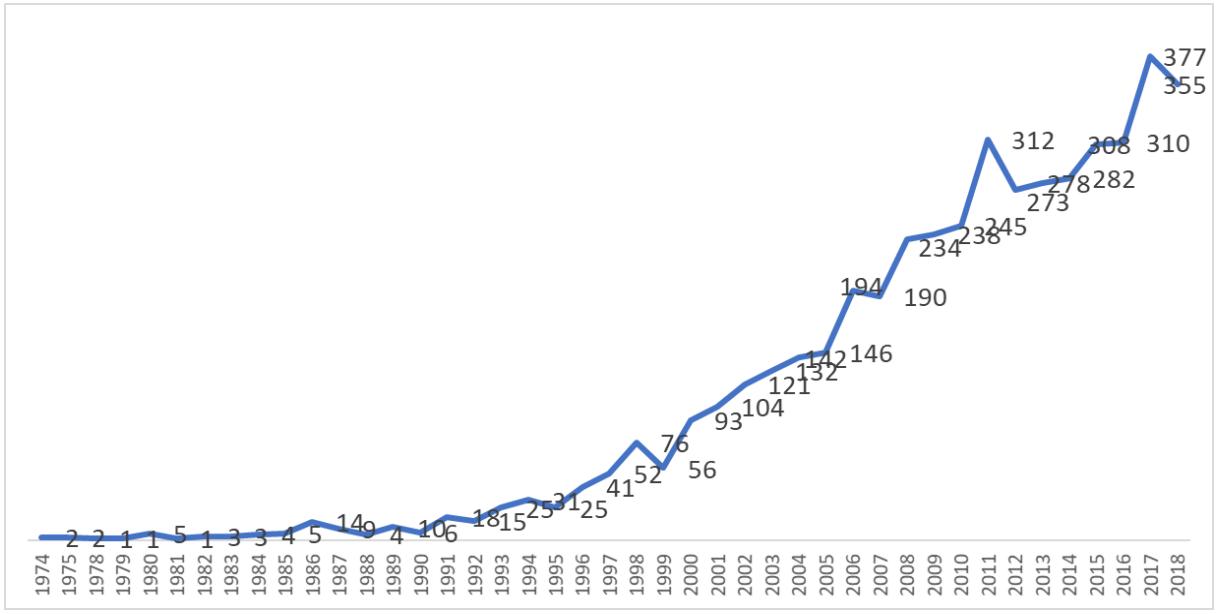


Fig. 1. Documents indexed in Scopus, 1974 - 2018

Source: Compiled from Scopus database

The authors have limited the scope of the research to the last ten years from 2009 to 2018 as the period up to 2009 has been already analysed. In total 5068 documents were found, including 3839 articles, 497 conference papers, 357 reviews, 225 book chapters,53 books and 97 other types. The first two documents appear in 1972, and the first one is a conference paper by Draper and Teorey (1972) regarding methods of software performance monitoring and data reduction that have been successfully used to provide a meaningful set of information for management decision making

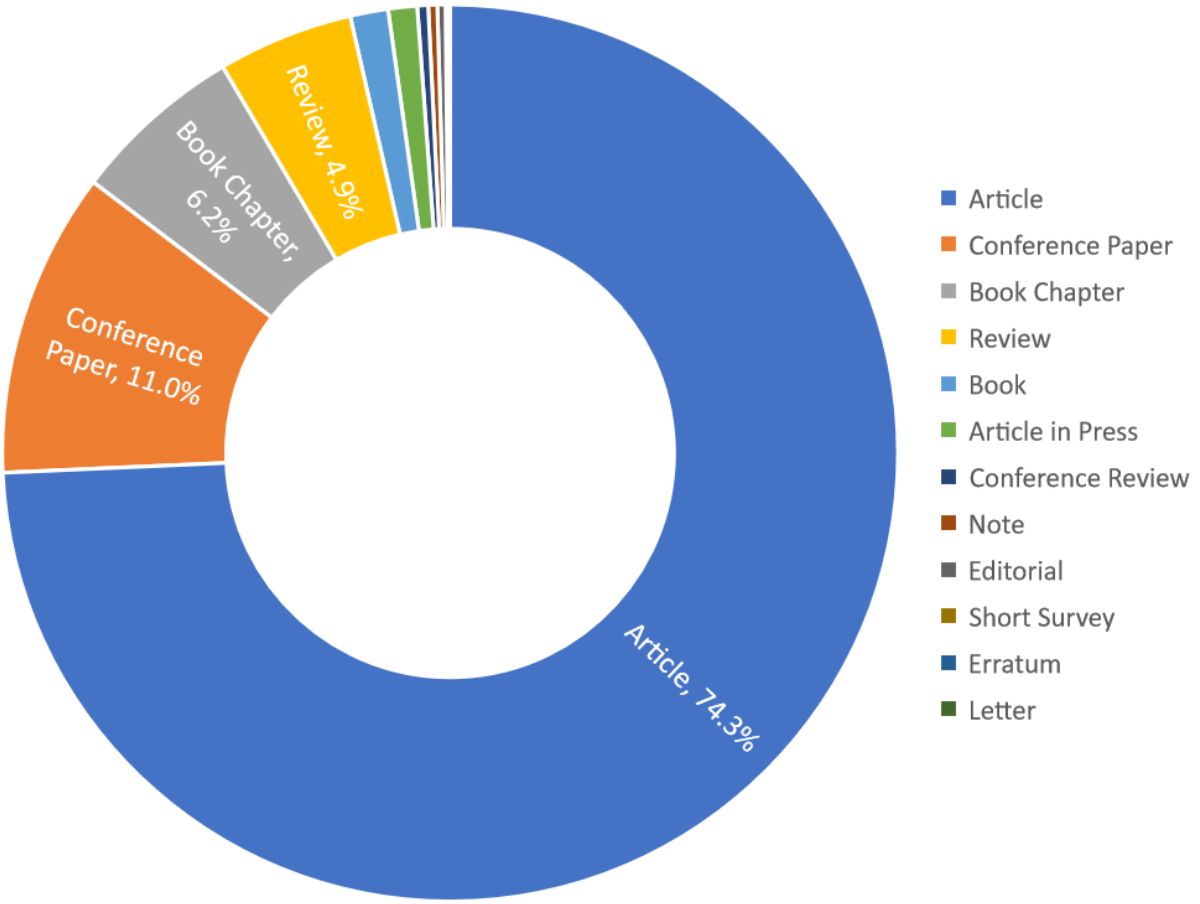


Fig. 2. Documents indexed in Scopus split by document type from year 2009 to 2018

Source: Compiled from Scopus database

Documents by type are reflected in Figure 2. There are four main types of documents and more than 2/3 or 74.3% are articles. Other documents comprise 25,7% where 11% are conference papers, 6.2% - book chapters, 4.9% reviews, books are 1.4% , etc. All the other document types – conference reviews, notes, editorial, short surveys erratum and letters are less than 1% each and in total 1.2%. If compared to results for period from 1974 to 2018, there are no significant changes in compositions of the references by types except for the reviews dropping from 7% in comparison to 4.9% in last ten years.

The authors have analyzed the articles in dimension of the subject areas. Although as mentioned before the study subject area was limited to business, management and accounting the analysis shows that half of the documents refer to other areas. Therefore, it is possible to assume that the area of performance measurement is closely related to other areas. The breakdown into areas by years provided by Scopus is reflected in Table 1 and Figure 3. The main cross subject areas are Decision sciences, economics, econometrics, finance and engineering, what can be clearly understandable because of key words "performance measurement". If compared the amount of documents of subject area in decision sciences to business, management and accounting there is clearly seen correlated documents. The same situation is with related subject area economics, econometrics and finance. The ratio in 2009 was 19% and fluctuating but has grown to 29% in 2017. Social Sciences comprise 49 percent of the literature stream.

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Agricultural and Biological Sciences	0	1	0	1	1	0	0	0	0	0
Arts and Humanities	5	4	2	5	8	3	3	3	5	0
Biochemistry, Genetics and Molecular Biology	0	1	0	0	0	0	0	0	0	10
Business, Management and Accounting	245	312	273	278	282	308	310	377	355	329
Chemical Engineering	0	0	1	0	1	0	1	0	0	0
Computer Science	21	15	19	20	18	49	33	31	42	37
Decision Sciences	66	47	60	67	61	76	82	91	89	98
Earth and Planetary Sciences	0	0	0	0	0	0	0	0	1	0
Economics, Econometrics and Finance	47	85	57	55	65	64	71	83	103	59
Energy	3	1	2	2	4	3	4	14	12	6
Engineering	48	35	47	48	47	50	61	88	64	75
Environmental Science	2	2	4	6	7	2	6	20	14	18
Health Professions	0	0	0	0	0	1	0	0	0	0
Materials Science	0	0	0	0	0	0	2	0	0	0
Mathematics	1	2	9	7	2	7	8	11	5	8
Medicine	8	2	1	4	3	3	4	7	3	7
Multidisciplinary	0	0	0	1	3	0	0	0	0	0
Nursing	6	0	1	2	0	0	1	2	1	2
Pharmacology, Toxicology and Pharmaceutics	0	0	0	1	0	0	0	0	0	0
Physics and Astronomy	0	0	0	0	0	0	0	0	0	1
Psychology	5	4	2	5	6	5	1	6	8	10
Social Sciences	31	50	35	42	45	34	45	54	51	65

Table 1. Documents indexed in Scopus split by subject area and years from 2009 to 2018

Source: Compiled from Scopus database.

Authors have assessed the main keywords using authors and index keywords. 2000 most cited publications were analysed using VOSviewer software and the keywords that appear at least 5 times were selected. The most frequently used keyword is “performance measurement” as set in search engine. Other most popular are benchmarking – 138, supply chain management – 149, performance measurement system 129, decision making – 87 and others. More detailed information can be found in Figure 3 “Most popular keywords in 2000 most cited articles, 2009 - 2018”

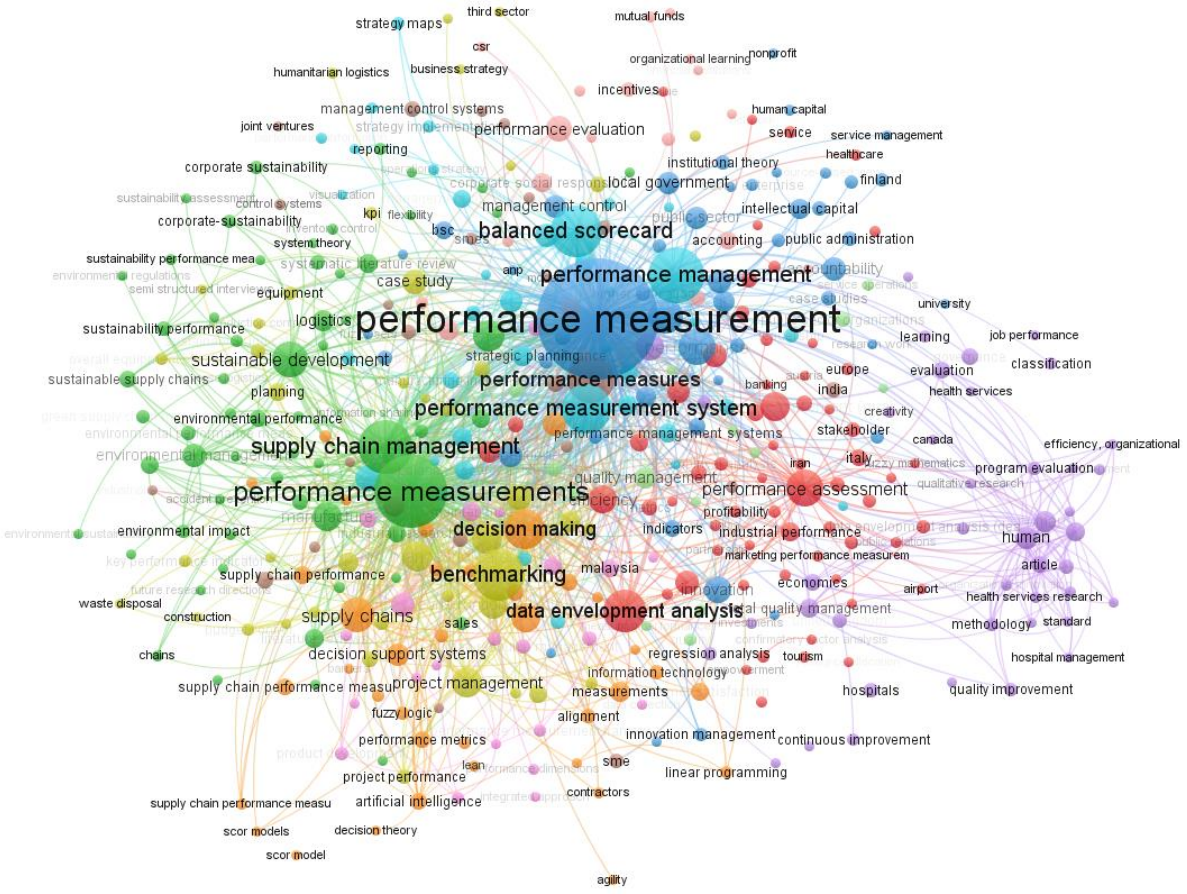


Fig. 3. Most popular keywords in 2000 most cited articles, 2009 - 2018

Source: Compiled using VOSviewer from Scopus database.

In top three journals that have published more than 50 articles in total were published 239 articles. The highest score 113 is for the International Journal of Productivity and Performance Management. The most citied paper in this journal is by Cocca and Alberti (2010) regarding development a framework that small and medium size enterprises can use to assess their performance measurement system in order to identify the main weaknesses and take corrective measures. The paper has 106 citations. In top 10 journals were published 521 articles constituting 17% share from total. The amount of the published documents in top three journals are shown in Figure 4 “Top 3 journals and documents indexed in Scopus split, 2009 - 2018”. Authors have generated the Scopus report Cite score for top 10 journals that is represented in Table 2 “Cite score of top 10 journals, 2009 - 2018”. According to the results it can be assessed that the journals with the highest paper score does not have the highest cite score. The highest Cite score has Journal of Cleaner Production. The most citied paper in this journal is by Nawrocka and Parker (2009) and this meta-study analyzes a pool of 23 studies connecting environmental performance to environmental management systems. The paper has 122 citations. In journal that has the next highest cite score International Journal of Production Economics paper by Hassini et.al (2012) has the highest citation number 419 and it represents literature review and provide frameworks for sustainable supply chain management and performance measures.

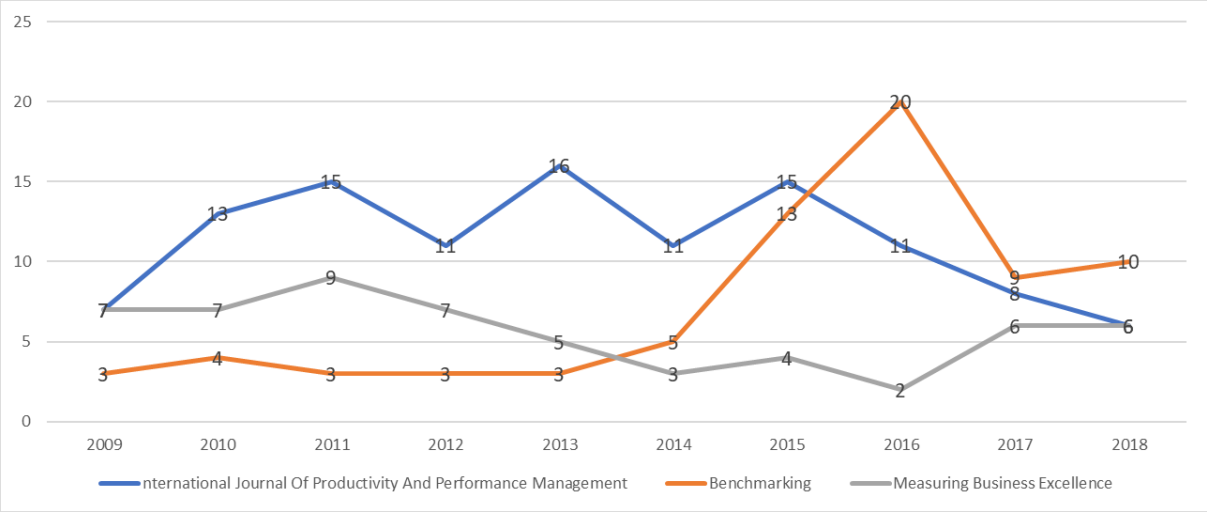


Fig. 4. Top three journals and documents indexed in Scopus, 2009 - 2018

Source: Compiled from Scopus database.

	2011	2012	2013	2014	2015	2016	2017
International Journal of Productivity and Performance Management	1.20	1.22	1.28	1.59	2.08	1.85	2.08
Measuring Business Excellence	1.04	0.99	1.36	1.10	1.32	1.38	1.59
Benchmarking	1.36	1.33	1.25	1.63	1.48	1.37	1.97
International Journal of Production Research	1.69	1.93	2.09	2.15	2.29	2.67	2.90
Production Planning and Control	0.87	1.21	1.29	1.95	2.23	2.45	2.84
International Journal of Production Economics	3.19	3.02	3.64	4.06	4.34	4.28	5.42
International Journal of Operations and Production Management	2.64	2.83	2.60	3.15	3.63	4.41	4.21
Journal of Cleaner Production	3.19	4.07	4.47	4.6	5.57	5.83	5.79
Public Performance & Management Review	0.00	0.50	0.42	0.75	1.00	1.74	1.35
Management Accounting Research	2.45	2.54	2.40	2.74	4.07	4.49	4.53

Table 2. Cite score of top 10 journals by years from 2009 to 2018

Source: Compiled from Scopus database.

Overlooking the period from 1974 we can see pan-world scale where more than 100 countries have published the research papers in this business measurement field. The top ten in volume of the research are United States (1140), United Kingdom (909), Italy (295), Australia (288), Germany (259), India (253), Canada (191), Finland (176), Netherlands (149), and Malaysia (146). The data are displayed as a map view in Figure 5 “Documents indexed in Scopus split countries, 1974 - 2018”, where the darker marked countries have published greater number of papers. The publications cover all continents and regions, developed countries as well as emerging ones.

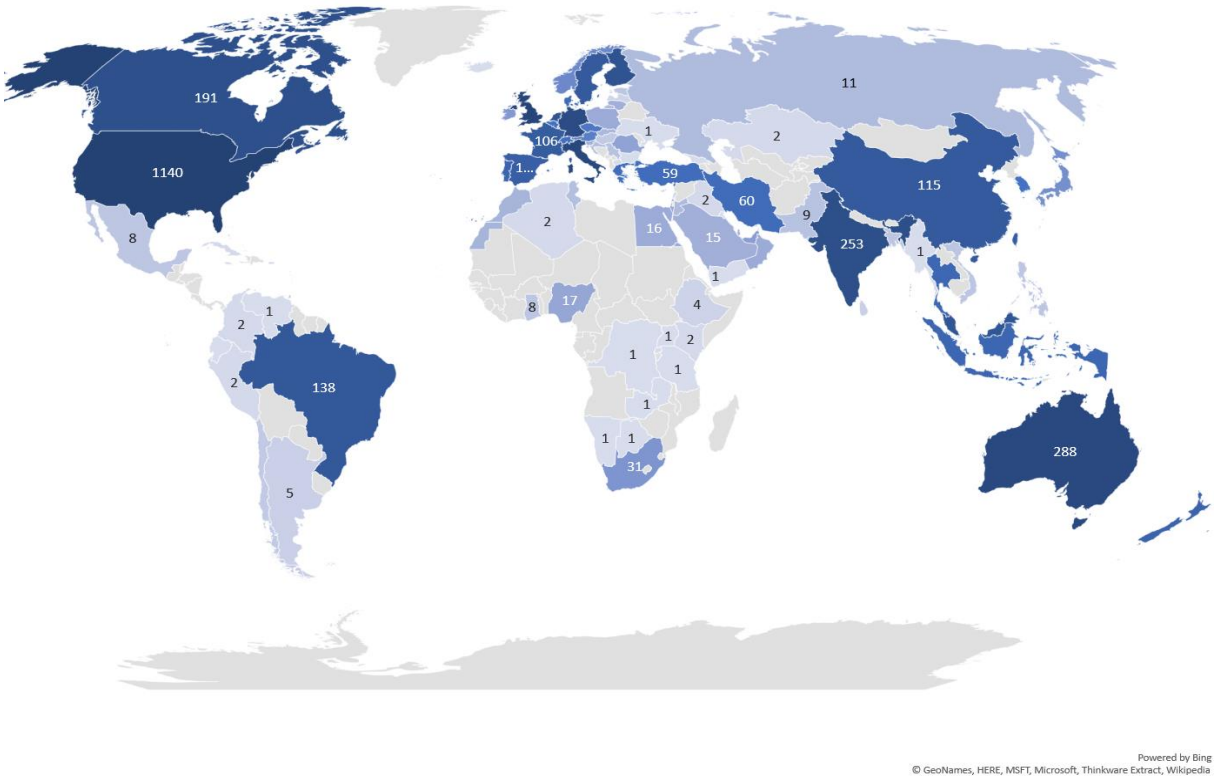


Fig. 5. Documents indexed in Scopus split countries, 1974 - 2018

Source: Compiled from Scopus database.

In total there are 169 authors that have published 3 and more articles. In Figure 6 "Leading authors by the number of the documents, 2009 – 2018" and Figure 7 "Top 10 authors by the document number, 2009 - 2018" visually are represented the author names according to the number of their articles.



Fig. 6. Leading authors by the number of the documents, 2009 - 2018

Source: Compiled from Scopus database.

These authors have published 10 and more papers within subject of this article but most of the authors have published twice more articles including other subjects, except one - Joseph Sarkis . J. Sarkis has published 341 articles in period from 2009 to 2018. His h- index is 77.

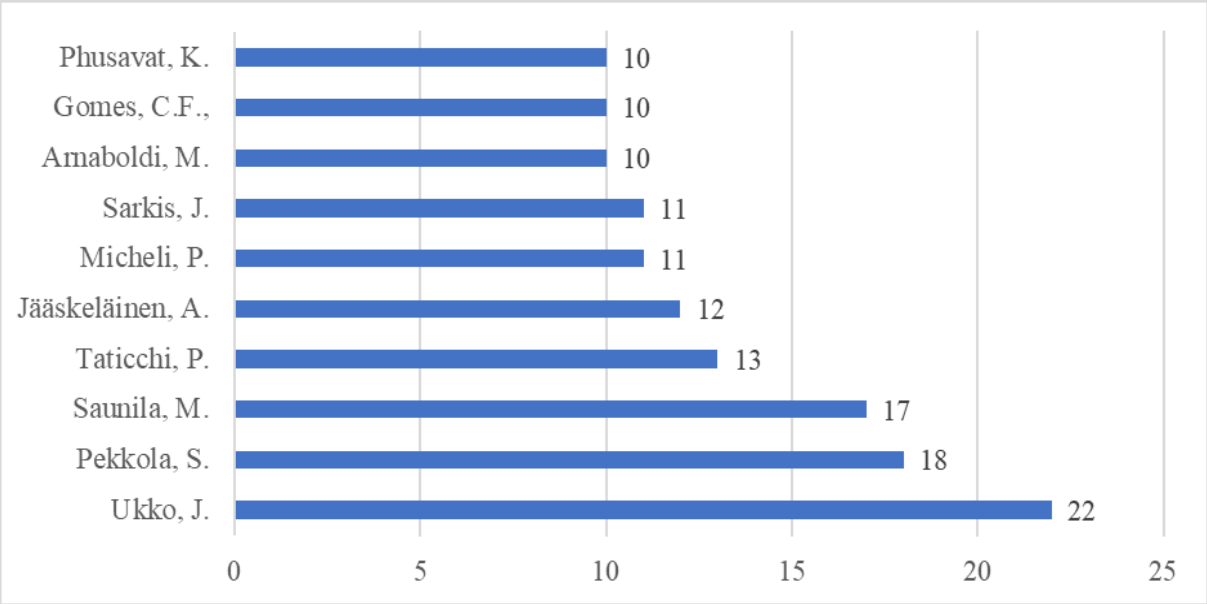


Fig. 7. Top 10 authors by the document number, 2009 - 2018

Source: Compiled from Scopus database.

Table 3 "Analysis of the citations, 2009-2018" shows the frequency of the most cited works and it shows that in the period of this research the citations have increased significantly. In total for all these selected papers there are 1593 citations, but if excluding self-citations 2015. The most cited articles provide frameworks for sustainable supply chain management and performance measures (Hassini et. Al. 2012), and examines the main organizational and cognitive dimensions emerging from the research literature on wicked problems (Head and Afford 2015) as well as bibliometric and network analysis that provides insights not previously fully grasped or evaluated by other reviews on this topic (Fahimnia 2015).

Author	Title	Year	Citations	Citations excluding self-citations
Hassini, E., Surti, C., Searcy, C.	A literature review and a case study of sustainable supply chains with a focus on metrics	2012	329	317
Head, B.W., Alford, J.	Wicked Problems: Implications for Public Policy and Management	2015	193	180
Fahimnia, B., Sarkis, J., Davarzani, H.	Green supply chain management: A review and bibliometric analysis	2015	198	177
Bititci, U., Garengo, P., Dörfler, V., Nudurupati, S.	Performance Measurement: Challenges for Tomorrow	2012	168	158

Franco-Santos, M., Lucianetti, L., Bourne, M.	Contemporary performance measurement systems: A review of their consequences and a framework for research	2012	154	148
Toor, S.-u.-R., Ogunlana, S.O.	Beyond the 'iron triangle': Stakeholder perception of key performance indicators (KPIs) for large-scale public sector development projects	2010	133	132
Arzu Akyuz, G., Erman Erkan, T.	Supply chain performance measurement: A literature review	2010	118	118
Kothari, S.P., Ramanna, K., Skinner, D.J.	Implications for GAAP from an analysis of positive research in accounting	2010	91	89
Barros, C.P., Managi, S., Matousek, R.	The technical efficiency of the Japanese banks: Non-radial directional performance measurement with undesirable output	2012	102	87
Meng, X.	The effect of relationship management on project performance in construction	2012	107	105

Table 3. Analysis of the citations, 2009-2018

Source: Scopus database

The analysis of citations for papers form 2009 to 2018 was also performed using VOSviewer software. The most cited 1000 papers were analyzed, and the results are in Figure 8 “Citation analysis of 1000 most cited authors’, 2009 - 2018”. The size of the bubble represents the total number of the citations. Cluster situated in the middle shows top listed papers. One of the most cited is article by Bitichi, Garengo, Dorfler and Nudurupati (2011) describing the changing environment of the performance measurement subject. This article has been cited 223 times and 72 times by other articles in the selected group. Another one is by Franco-Santos, Lucianetti and Bourne (2012) and the main purpose of this paper is to develop a conceptual framework for understanding the literature on the consequences of contemporary performance measurement systems and the theories that explain these consequences. This article has been cited 200 times and 69 times by other articles in the selected group.

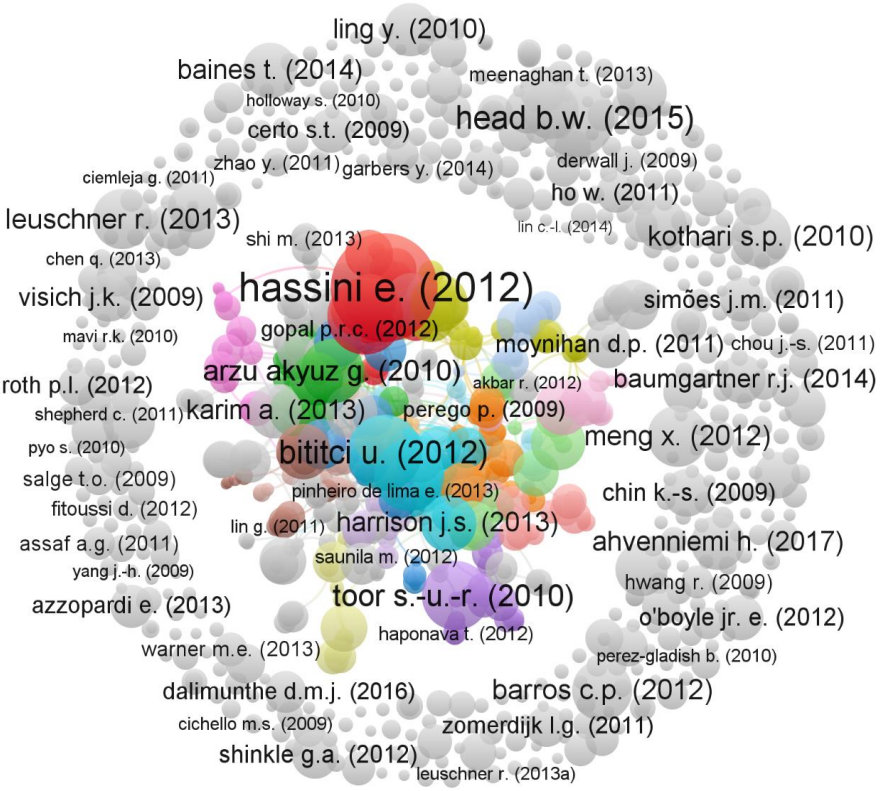


Fig. 8. Citation analysis of 1000 most cited authors, 2009 - 2018

Source: Compiled using VOSviewer from Scopus database.

The co-citation analysis was performed for the period from 1974 to 2018 analysing the 1000 most cited papers. The results are visually represented in Figure 9 “Co-citation analysis of 1000 most cited authors, 1974 – 2018”. Four different clusters can be clearly separated. Each circle in the visualization presented in Figure 9 represents an author. The size of a circle reflects the number of the citations of the particular author.

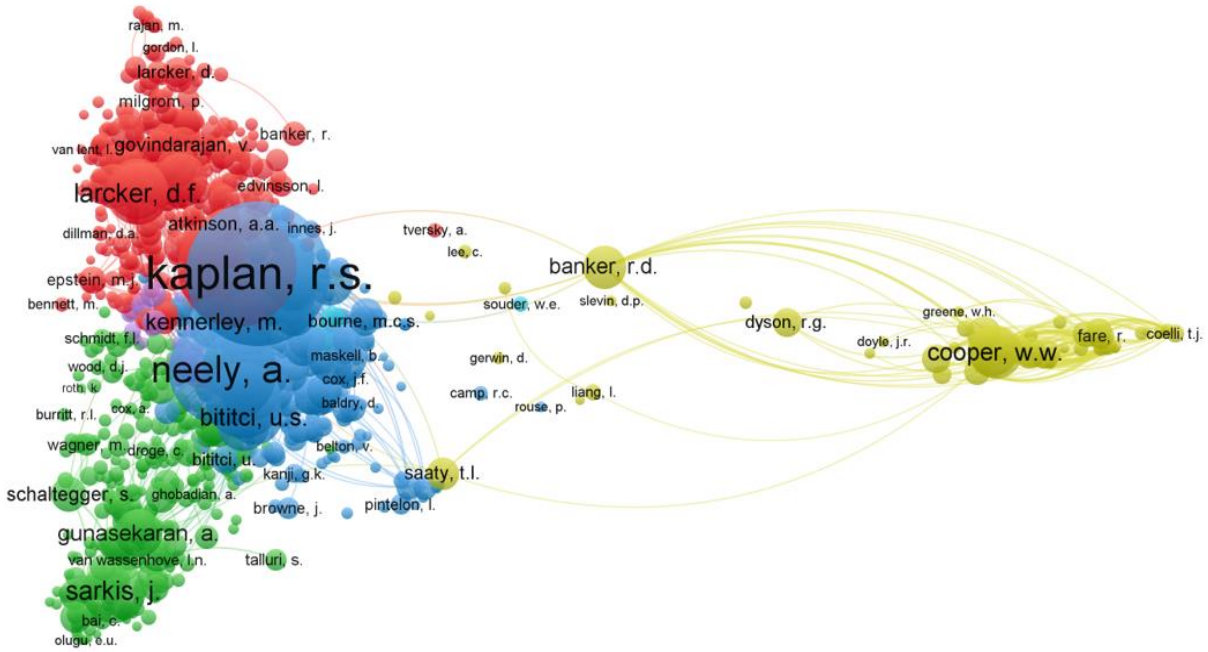


Fig. 9. Co-citation analysis of 1000 most cited authors, 1974 - 2018

Source: Compiled using VOSviewer from Scopus database.

Authors that are located close to each other in the visualization tend to be more strongly related, based on co-citations, than authors that are located far away from each other. (Wan Eck and Waltman 2014). One cluster is represented by R.S. Kaplan and A. Neely the other two clusters mainly D. F. Larcer and Sarkis, and very separately are cited works by W. W. Cooper and R. D. Banker.

4. DISCUSSIONS

Neely and later, his followers in 90s and 00s argue that due to diversity of the disciplines involved and not yet sufficient volume of the research the field of performance measurement has not professionalised from an academic perspective. The facts behind were statistics on publications in dynamics, for example, the most cited publications were published in the 90s only (Neely 2005) and the only 10 publications were cited more than 30 times by 2012 (Tatticchi 2008).

Since the lack of published research on PMM, the authors in 00s decided to shift the research methodology from citation/co-citation analysis to a more qualitative approach, such as a structured literature review.

The authors of the current research can clearly see the pattern in the development of research and suggest the research has reached the certain level of maturity and can be classified as academic discipline. The amount of the research has steep learning curve and can be systemized.

Moreover, the discussions on the performance expansions has been changed for the statements that there are too many ratios and they have to classified and tailored to the target groups of the users to avoid unified use and uncontrolled implications that is subject for the further research.

5. CONCLUSIONS

1) Performance measurement and management field has attracted vast attention since 1970s. Measurement has been recognized as a crucial element to improve business performance and as a consequence interest on the performance measurement and management (PMM) has notably increased;

2) The upward steady growth in number of the publications in performance measurement can be clearly observed.

3) There are four main types of documents where articles form the dominant part constituting 74.3% of the total number of the documents;

4) Performance measurement system proves to be interdisciplinary discipline, where 50% comprise Business research and 50% are represented by at least 10 other disciplines creating the strong grounds for the cross sectorial multi-area research;

5) Overlooking the period from 1974 we can see pan-world performance measurement research scale where more than 100 countries are involved in the research. The top ten in volume of the research are United States (1140), United Kingdom (909), Italy (295), Australia (288), Germany (259), India (253), Canada (191), Finland (176), Netherlands (149), and Malaysia (146);

6) The frequency of the most cited works has increased accordingly. In total for all these selected papers there are 1593 citations, but if excluding self-citations - 2015. The most cited articles provide frameworks for sustainable supply chain management and performance measures (Hassini et. Al. 2012);

7) The analysis of the most cited 1000 papers/authors shows clear patterns in citation framework, identifying the leaders and indicating the size of citation scope. One of the most cited is article by Bitichi, Garengo, Dorfler and Nudurupati (2011) describing the changing environment of the performance measurement subject with 223 citations;

8) Co-citation analysis of 1000 most cited authors crystallizes four different clusters where size of a circle reflects the number of the citations of the particular author. One cluster is represented by R.S. Kaplan and A. Neely the other two clusters mainly D. F. Larcer and Sarkis, and very separately are cited works by W. W. Cooper and R. D. Banker.

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