Knowledge Management in Organizations - A Bibliometric Analysis of Research Trends

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Abstract. Knowledge management became an important part of our economy far before than the actual term "knowledge management". Many studies have been written about different aspects and viewpoints of knowledge management, however in this study we used a bibliometric mapping approach to determine the main research topics and the contexts in which they are employed. 10,599 information sources were retrieved from the Scopus bibliographical database using the search string "knowledge management" AND organization. Most information sources were published as conference papers or journal articles. The most productive period was from 2007 till 2011. United States, United Kingdom and China were the most productive countries. Four main research topics were identified: Education and healthcare, Techniques and systems, Knowledge management and Knowledge sharing. Chronologically, five periods emerged, namely: Infrastructural and organizational research, Technical issues and knowledge management systems in organizations, Enabling technologies, Practical applications of knowledge management in organizations, and Evaluation and validation of knowledge management practices.

Keywords: Knowledge management · Knowledge management in organizations · Research trends · Bibliometrics · Bibliometric mapping analysis

1 Introduction

Knowledge management (KM) practices have been an important part of our economy far longer than the actual term "knowledge management" started to receive considerable attention from both academic and economic sphere in late 1980s [1]. Different approaches have been invented throughout history which allowed people to pass knowledge to descendants or to share it in order to build on earlier experience. Modern concepts and practices of knowledge management, however, evolved throughout the last two decades, in times when the knowledge was recognized as a critical resource, vital for economic growth.

KM consists of the systematic processes for acquiring, organizing, sustaining, applying, sharing, and renewing all forms of knowledge, to enhance the organizational performance and create value [2]. KM is about acting to build and leverage knowledge

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through an understanding of how it is created, acquired, processed, distributed, used, harnessed, controlled, etc. [3]. Therefore, knowledge management aims to facilitate the access, use, and reuse of valuable knowledge resources [4]. Effective KM involves learning to manage knowledge as both an object and as a process [2, 5], which requires executives to develop a general understanding of what knowledge is, as well as efficient and systematic methods for managing it within the organization [3].

Since the 1990s there has been an obvious shift from an information-based economy to a knowledge-based economy [1]. The success of business operating in an increasingly competitive marketplace of the knowledge-based economy depends critically on the quality of knowledge which those organizations apply to their key business processes [6]. Therefore, creation, management, and sharing of knowledge within the organization have become one of the important factors of the competitiveness that should not be overlooked by companies and organizations.

Simultaneously with the expansion of KM practices in organizations, a huge amount of research theories, topics and results have been published within the interdisciplinary field of knowledge management. KM publications in general focus on knowledge in organizations, knowledge-based, theory of the firm, strategy, and knowledge creation [7]. Even though KM discipline is relatively a new research discipline, it has already boasted a number of scientometrics research with the purpose of better understanding its identity. In this manner, [8] looked at the breadth and depth of the field, and searched for interdisciplinary connections among researchers. Chauvel and Despres [9] examined KM research area in six dimensions: phenomena, action, level, knowledge, technology and outcome. In [10] a meta-analysis has been applied to publications in three major KM journals (Journal of Knowledge Management, Journal of Intellectual Capital, and Knowledge and Process Management). In [11] authors extended this work by examining the most influential KM publications, and explored the specific issues of subjectivity and objectivity.

Dwivedi et al. [12] found organizational and systems context-based KM research are the most widely published topics. Chen and Xie [13] built an intellectual structure by examining a total of 10,974 publications in the KM field from 1995 to 2010. Document co-citation analysis, pathfinder network and strategic diagram techniques were applied to provide a dynamic view of the evolution of knowledge management research trends.

In this paper, however, we aim to provide an overview of the knowledge management in organizations (KMO) field using a bibliometric mapping approach of the KM in organization literature production. Bibliometric mapping approach is based on the text analysis of abstracts and relies on computer algorithms and visualization techniques [14]. Its results are term maps, in which terms are located in such a way that the distance between any two terms reflects the relatedness of the terms; terms are also grouped in clusters based on calculated term relevance scores [15]. In this way, a scientific landscape of main concepts, topics and terms in the KMO field will be created. Moreover, important relations between KMO topics and terms will be studied and identified. Interpretation of the maps will be based both on our experiences in the KMO field and the published literature. In this way, past, current and future research trends within KMO will be discussed.

2 Bibliometric Analysis

Bibliometrics could be described as an answer to the saying that 'if you can't measure it, you can't manage it". It became prominent because of the need to measure the effects of the large investments going into the research and development. Bibliometrics has its origins as early as the beginning of the last century, but, it became data-driven in 1964 with the introduction of the science citation index. Bibliometrics [16–18] analyses the properties of literature production in terms of measures like number of articles on a particular topic, the dynamics of literature production, most prolific source titles, most productive countries, institutions and authors and most cited papers. It could be formally defined as "the quantitative analysis of the bibliographic features of a body of literature" [19]. The idea is based on the assumption that most scientific discoveries and research results are eventually published in international scientific journals where they can be read and cited by other researchers. It uses quantitative methods for analyzing written documents. Bibliometrical studies are also used to examine the history and structure of a field, the flow of information into a field, the growth of the literature, patterns of collaboration amongst scientists, impacts of journals, and the long-term citation impact of a work [17].

A recent technique used in bibliometric analysis is bibliometric mapping [20] which visualize literature production based on word co–occurrences [7], co–citations, co–references, etc. A popular bibliometric mapping software is the VOSviewer[1] (Leiden University, The Netherlands) [21]. It creates so called term maps which express terms relatedness, associations between terms, and importance of terms.

2.1 Data Source and Corpus

Scopus (Elsevier, Netherlands) was selected as a bibliographical database from which the corpus was formed on February, 23rd, 2015. The search keyword string used was "knowledge management" AND "organization". Search was performed in information source titles, abstracts, and keywords. All types of information sources written in English in the period 1977–2014 were included in the corpus.

2.2 Data Extraction and Analysis

Most productive countries, institutions, source titles, literature production dynamics and research subjects were extracted by Scopus built-in functions. Scopus records including information source abstract year of publication were pre-processed in Excel (Microsoft, USA) and exported to VOSviewer (Leiden University, The Netherlands) for bibliometrics mapping analysis.

[1] VOSviewer – Visualizing scientific landscapes, http://www.vosviewer.com/Home.

3 Results and Discussion

The corpus consisted of 10,599 information sources. As shown in Table 1, most of the information sources were presented as conference papers followed by journal articles. The large number of conference papers shows that the knowledge management in organisations is still forming its body of core literature on one hand and on the other hand that it is in rapid development as a scientific field needing rapid publication of results at conferences and critical and fast appraisal and validation of ideas on discussions during conference paper presentations.

Table 1. Types of information sources

Type of information source	Number of information sources
Conference paper	5,111
Article	4,337
Review	496
Book chapter	352
Conference review	114
Book	86
Article in press	30
Short survey	30
Editorial	23
Note	16

The dynamics of literature production presented in Fig. 1 shows a positive trend in the period 1996–2010, then a rapid decline in the number of published papers. On the first sight this observation might seem in contradiction with the statement above that the filed is still in development, and thus the number of information sources should be increasing. Figure 2 shows the literature production dynamics separately for articles and conference papers, and while the publication dynamics of conference papers shows a strong negative trend, the dynamics of article production is more stable and even increasing in the year 2013.

As expected most productive source titles (Table 2) are categorized as both conference proceeding and journals from computer science, knowledge management and artificial intelligence fields. The articles are not yet published in top journals (mostly journals are ranked in the second or third quarter of all journals), which confirms our thesis that the knowledge management in organisation field is still developing its core research literature production.

Not surprisingly most productive countries (Table 3) are also the most developed, and industrialized ones. Top ten countries represent the 65.1 % of all research literature production. These results reveal that countries that have shown an immense interest in the KMO research area are generally the same countries that have a healthy and competitive economy.

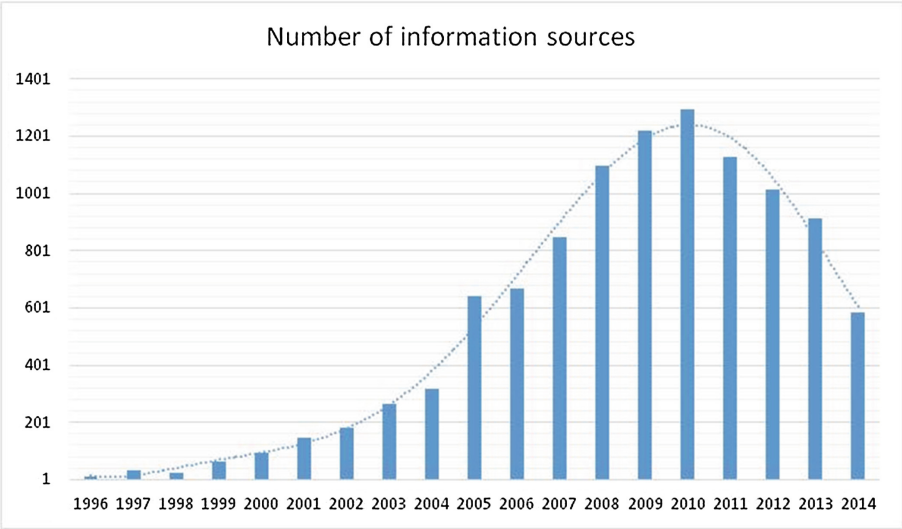

Fig. 1. The dynamics of research literature production for all information sources

The most productive institutions (Table 4) are coming from the most productive countries, with the exception being Daneshgahe Azad Eslami, which is located in Iran. Among top ten most productive institutions there are six from South East Asia: one from Singapore (National University of Singapore), two from Hong Kong (Hong Kong Polytechnic University and City University of Hong Kong) and even three from

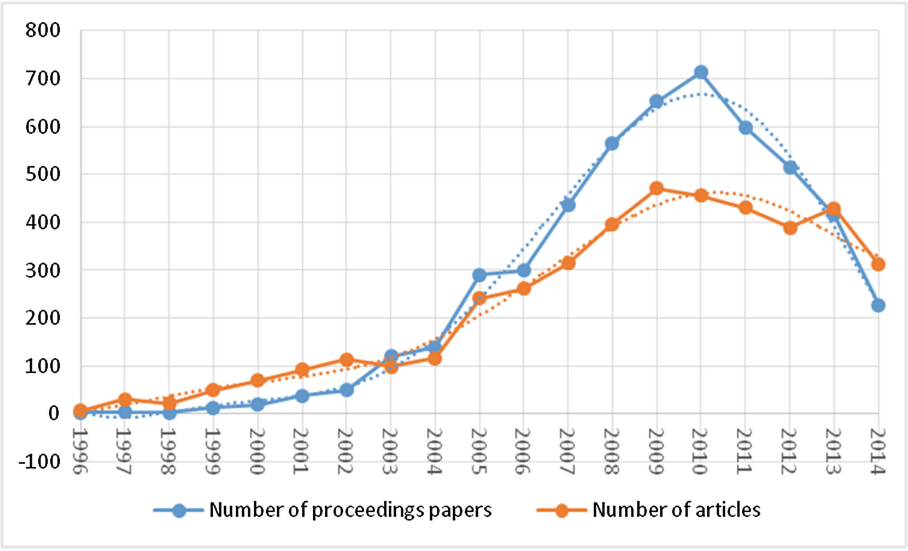

Fig. 2. The dynamics of research literature production for conference papers and articles

Table 2. Ten most prolific source titles

Source title	Number of information sources	SciMago journal rank
Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	293	Proceedings
Journal of Knowledge Management	280	13,989
Vine	109	9,150
Journal of Information and Knowledge Management	106	18,564
Communications in Computer and Information Science	92	19,048
IFIP Advances in Information and Communication Technology	87	15,988
International Conference on Information and Knowledge Management Proceedings	84	Proceedings
Knowledge Management Research and Practice	77	9,163
Expert Systems with Applications	71	2,313
Learning Organization	68	9,364

Malaysia (Multimedia University, Universiti Teknologi Malaysia, and Universiti Teknologi MARA), which may be a bit surprising. It is also interesting that there is only one institution among top ten which is from USA (George Washington University), even though the USA is (by far) the most productive country within the field of KMO research.

Table 3. Ten most productive countries

Country	Number of information sources
United States	2,091
United Kingdom	1,135
China	802
Australia	608
Germany	491
Malaysia	379
Canada	370
Taiwan	355
Spain	341
Italy	336

The research in knowledge management in organisations is mostly focused on computer science, business, management, accounting, engineering, decision sciences and social science and also a bit surprisingly with health related research subjects (Table 5). It is interesting to see, that the number of information sources are almost

Table 4. Ten most productive institutions

Institution	Number of information sources
Loughborough University	89
Daneshgahe Azad Eslami	75
National University of Singapore	72
Hong Kong Polytechnic University	65
Multimedia University	65
Universiti Teknologi Malaysia	61
City University of Hong Kong	59
Universiti Teknologi MARA	50
University of Salford	48
George Washington University	46

Table 5. Ten most productive research subjects

Research subject	Number of information sources
Computer Science	4537
Business, Management and Accounting	3287
Engineering	2272
Decision Sciences	2070
Social Sciences	1996
Mathematics	578
Medicine	419
Economics, Econometrics and Finance	258
Biochemistry, Genetics and Molecular Biology	181
Environmental Science	178

evenly distributed between social sciences, decision sciences, and engineering, which confirms the interdisciplinary manner of knowledge management in organizations. Business, management and accounting as a driving force and computer science as an enabling field reign at the top of the list.

Bibliometric mapping analysis created four clusters (Fig. 3). Based on the terms we assigned a research topic to each cluster and if necessary divided each topic to sub-topics. In this way, four topics were defined:

- Education and healthcare (yellow cluster)
  - Healthcare (medicine, health, healthcare organization,. nurse, patient, hospital, evidence)
  - Education (student, faculty, education, center)
- Techniques and systems (red color)

  - Web (web, access, digital library, e-learning, security, semantic web, information need, ontology, metadata, wiki, social network)
  - Document management (document, text, graph, annotation, keyword, language, data set, domain, reuse, artefact)
  - Management system (project manager, risk management, task, business rule, technique, project management, knowledge mapping, business process, supply chain, business goal)
  - Software (software engineering, software development, software development process, iso, process improvement)
- Knowledge management (blue colour)
  - Activities (knowledge management process, knowledge creation, km process, km activity, knowledge activity, knowledge conversion, socialisation)
  - Entities (organisational culture, explicit knowledge, medium sized enterprise, competitive intelligence)
- Knowledge sharing (green colour)
  - Customer (customer, customer knowledge, crm – customer relation management, alliance, marketing, knowledge integration)
  - Resources (dynamic capability, km capability, organisational capability, social capital, organisational performance, generalizability)

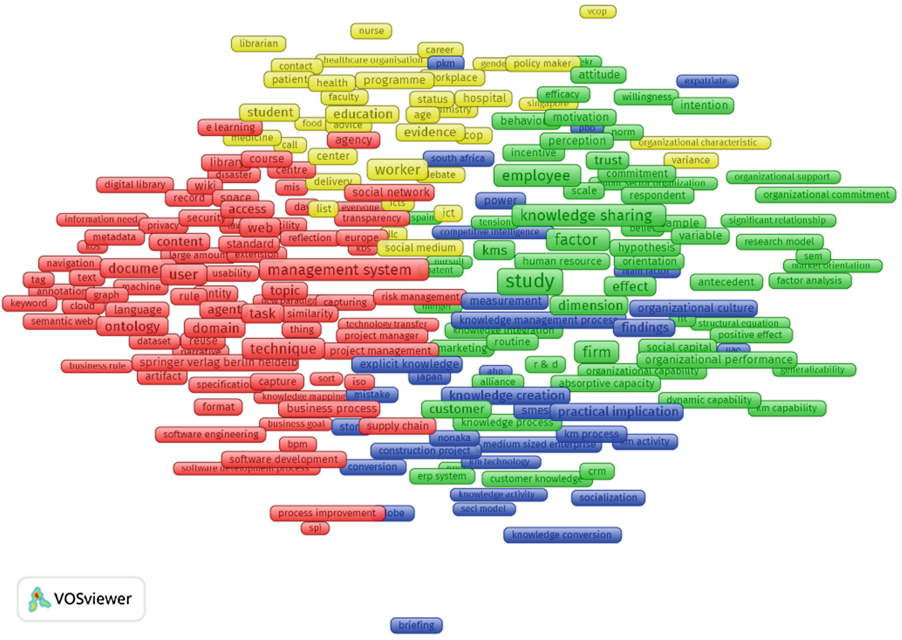

Fig. 3. The term map of all terms with more than 15 occurrences. Four clusters, representing main research topics, were identified: Education and healthcare (yellow), Techniques and systems (red), Knowledge management (blue) and Knowledge sharing (green) (Color figure online).

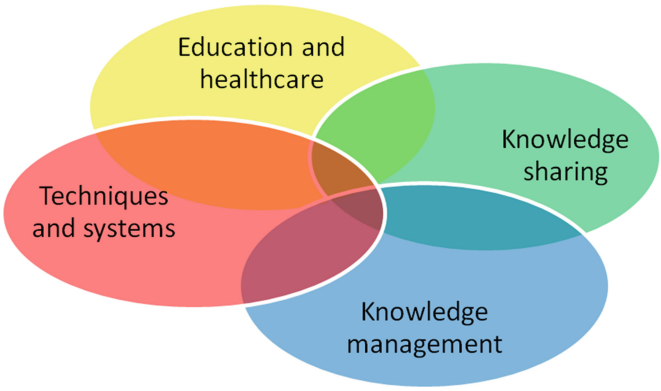

Fig. 4. The four identified clusters of knowledge management in organizations research.

- Motivational factors (trust, commitment, organisational support, motivation, willingness, attitude, efficacy, norm, behaviour)
- Models (factor, variable, dimension, effect)

The four identified clusters of KMO research are depicted on Fig. 4.

The results of bibliometric mapping analysis of KMO from the chronological point of view are presented on Fig. 5. The analysis was focused on the most productive

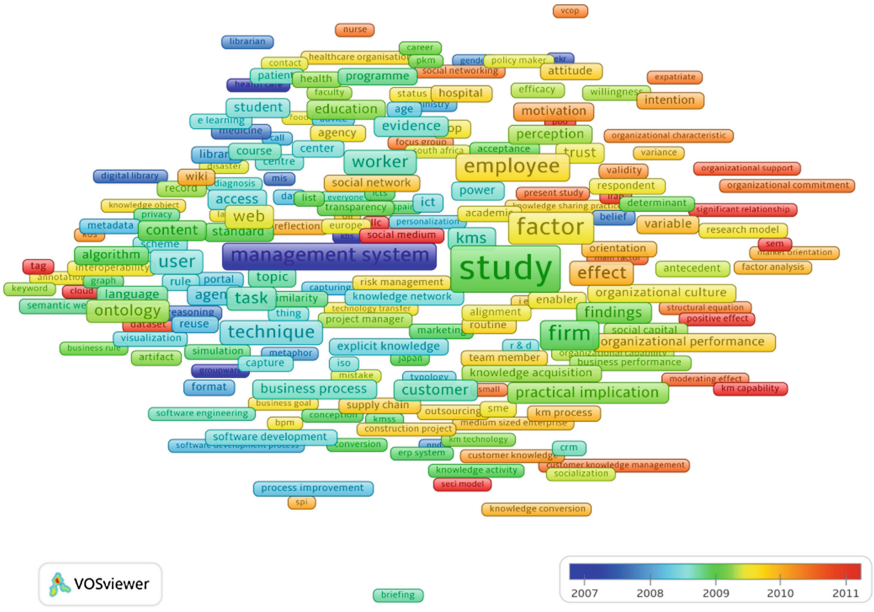

Fig. 5. The term map of all terms with more than 15 occurrences throughout time based on publication date. Five periods emerged: infrastructural and organizational research, technical issues and KM systems in organizations, enabling technologies, practical applications of KM in organizations, and evaluation and validation of KM practices.

period between 2007 and 2011 (see Fig. 2). In this way 5 periods of KMO research were identified.

It can be seen that in the earlier period of KMO research mainly infrastructural and organizational topics were addressed (management systems, groupware, library, digital libraries). It is interesting that in that early period KM research was primarily oriented towards medical and healthcare organizations (healthcare, medicine, and medical information systems were, and still are for that matter, important research terms of KMO research).

Then, these fundamental questions were expanded and deepened mainly in two directions: some researchers focused on technical issues on how to put KM into practice (the main terms being techniques, software development, software engineering, reuse, visualization, capture, access, metadata, explicit knowledge), while the others focused on users of KM systems in organizations (the main terms being user, customer, worker, student, patient, personalization).

Having the infrastructure, developed methodologies, enabling technologies, identified processes and educated users, the research trends then focused on practical applications of KM in organizations and setting the goals toward making use of it. In this manner, publication topics focused on general aspects (employees, team members, organizational culture, organizational performance, business goals, social networks, trust) as well as specific fields (hospitals, agencies, healthcare organizations, academia, medium sized enterprises, ERP systems) and/or regions (Europe, Japan, South Africa, Iran).

Finally, the most recent publications focus on evaluation and validation of KM practices, methods and technologies (the most frequent terms being variables, factors, factor analysis, significant relationships, KM capability, structural equation, validity, positive effects, moderating effects).

It can be seen that chronologically the following five periods emerged: Infrastructural and organizational research, Technical issues and knowledge management systems in organizations, Enabling technologies, Practical applications of knowledge management in organizations, and Evaluation and validation of knowledge management practices. They are depicted on Fig. 6.

Based on the evolution cycle presented in Fig. 6 we might expect that evaluation and validation of KM practices will catalyse new KM approaches, theories and practices leading to the beginning of a new evolution cycle. Some of the emerging technologies with viable perspective are media – supported knowledge management [23], semantically enhanced KM systems [24] and global knowledge management [25].

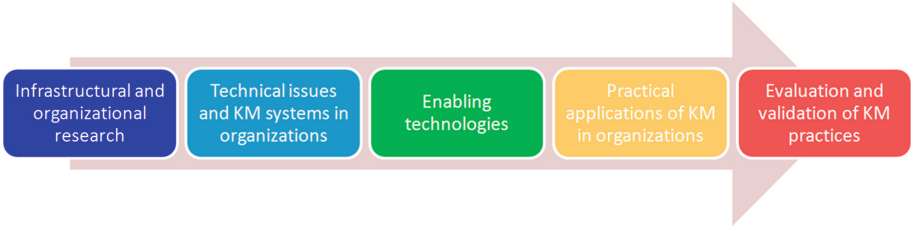

Fig. 6. The five emerged periods of knowledge management in organizations research.

4 Conclusions

In this paper we focused on knowledge management in organizations as a term in scientific publications, where we tried to identify the past and current state of this research area and its potential for the future. Not only have we highlighted all the different states of this research area, we have also identified all the main fields that KMO is applied to or has been researched in.

The results of the performed bibliometric mapping analysis reveal that countries that have shown an immense interest in this research area are the same countries, at least for the main part, that have a healthy economy. The results also showed that knowledge management has been, right from the beginning of more intensive KMO research, very much oriented toward medical and healthcare organizations. And it still is – according to [22], biotech industry firms are (by far) the most aware of the importance of knowledge management practices among all industries.

What is especially interesting and shouldn't be overlooked, are our findings that the whole research area has been undergoing a healthy evolutionary cycle. This is showing that KMO is evolving and maturing, which best explains the wide spread use and research of this area. Since we have drown quite some links, not only between the main areas that KMO is applied in, but also between different sub areas or sub domains, we can see different trends emerging and can even more clearly see their roots. Though we have detected a recent decrease in certain types of publications when it comes to KMO, we have observed that this is an indicator of maturing of a research field and should be understood as a sign that we can expect a probable drop in quantity and an increase in quality of further researches.

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