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Research Trends on Business Process Management in Higher Education and Recommendations for Vietnam

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ABSTRACT

Business process management at universities appears to be one of the acute issues which allow universities to foster their training quality, along with significantly contributing to creating recommendation policies for the business process management to gain effectiveness. In this research, the bibliometric analysis approach is used to evaluate scientific results on publications related to research trends in business process management at universities bibliometrics in the Scopus database. 990 publications have been extracted to analyze growth trends, contributions of authors, research institutions, co-authors in research sectors, and the development of research trends. Research implications are used to suggest research trends on business process management in several developing countries, particularly case studies in Vietnam.

KEYWORDS

Bibliometric Analysis, Biblioshiny, Business Process Management, Scopus, VOSviewer

1. INTRODUCTION

Developing countries in general, and Vietnam in particular, are gradually transforming the management mechanism among organizations, companies, and schools to self-reliance to maximize the organization's human resources and create a professional working environment. This will enhance to bring about high efficiency of the organization. In Vietnam, universities are moving towards autonomy. Thus, it is necessary to reform the management process at those universities, especially the business process in institutions.

Many qualitative and quantitative statistical and analytical methods have been used to analyze and evaluate the quality of scientific publications (Aria & Cuccurullo, 2017). Business process management (BPM) is one of the most available themes in the information sector since, on the one hand, it wrestles with the interplay of people and organizations (Aalst, 2004; Viriyasitavat et al., 2020). A business process can be defined as one set of related tasks or activities that lead to a particular product or service. We can divide all processes into three categories: management processes (to direct the operation of the system), operational processes (the nature of the business activity and a source of added value), and processes. Support processes (to support critical processes) (Wiechetek et al., 2017;

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Bubenik et al., 2022). A wide range of qualitative and quantitative statistical and analytical methods have been used to analyze and evaluate the quality of scientific publications (Aria & Cuccurullo, 2017). Business process management has been mentioned in numerous documents, and scientists are showing particular interest and the benefits of applying appropriate business process management, and its benefits have been especially appreciated by many individuals and organizations (Gulledge & Sommer, 2002; Plattfaut, 2022). Chaos is inevitable if a unit where business processes management poses the insufficiency of organization and systematization. This is not an exception among universities in business processes management that meet the demand of consistency with the theory and practice of business process management (J. Brocke, 2015; Jurczuk, 2021).

In order to be capable of innovating the business process management at universities in Vietnam, a team of scientists plays a vital role in studying the achievements of business process management in universities. The scientists studied by international researchers make adjustments to reality and apply to Vietnamese universities.

The study team presents the findings of bibliometric analysis of academic papers on research process management that have been included in the Scopus database over the years in this paper. The three main objectives are to (a) summarize the general traits and trends of scholarly publications, the most important source journals, and the most productive researchers; (b) examine international cooperation among nations in this field; and (c) extract the most popular research topics and trends based on word analysis of titles, abstracts, and keywords. Finally, based on the study' findings, suggestions and fixes will be put up for creating operational process management research directions in Vietnamese universities.

2. LITERATURE REVIEW

2.1 Bibliometrics

Bibliometrics, or scientometrics, introduced by Pritchard (1969), is one of the effective methods for measuring the quality of research documents through the statistics of quantitative data of scientific publications (Broadus, 1987). Bibliometrics is a mathematical statistical method in the analysis of scientific publications. In addition to providing overview information about prominent scientific publications, authors, and scientific journals in a scientific sector, bibliometrics also provides other important types of quantitative information. Such as research trends, the degree of influence of studies on the scientific community, and trends in scientific cooperation among authors, research institutions, or between nations (Chiu & Ho, 2007; Md Khudzari et al., 2018; Zou et al., 2018). Bibliometrics is now widely used for the quantitative analysis and evaluation of scientific publications in various scientific fields (Ding, 2017). The information acquired from scientific quantification is beneficial in helping scientists get an overview of the fields of research, for example, the number of annual scientific publications, ranking of journals, ranking journals, ranking scientific research institutions, and ranking scientists based on the number of papers published and cited, and significant and potential research trends.

Scientometrics, or bibliometrics, is a relatively new branch of science concerned with the quantitative evaluation of science through publications (Bellis, 2012). The term "bibliometric" can be interpreted in Vietnamese as "scientific bibliographic measurement" "scientific publication measurement" or "scientific evaluation through publication quantification" (Ly, 2015). Scientometrics is regarded as an impartial way to assess the value and impact of scientific publications. Scientific papers through quantitative analysis and evaluation or Scientometrics offer quantitative data on citations and publications in the scientific field. This knowledge provides scientists with study units or directions, and gives businesses and government agencies a foundation for funding and allocating resources for scientific research (Waltman & Noyons, 2018). Furthermore, university ranking organizations use scientometrics as an essential tool to evaluate universities (Charlton & Andras,

2007). It can also be used to evaluate a nation's progress in scientific research and comprehend where it is right now (Ha et al., 2020).

According to Börner, Chen, & Boyack (Borner et al., 2003), the scientometrics process for a scientific field involves five main steps: (1) Research design, (2) Data collection, (3) Analyze data, (4) Visualize data, and (5) Interpret results.

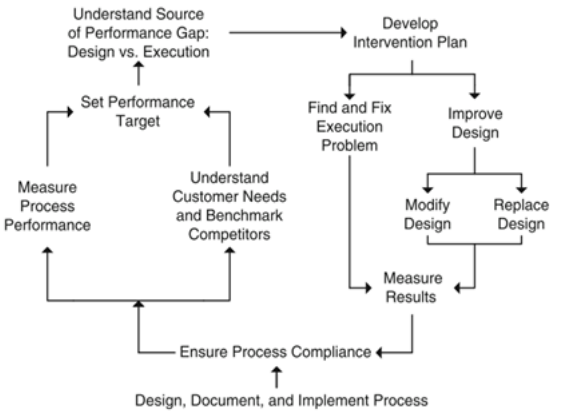
In the phase of research design, the scientist must define the research questions and choose appropriate scientometrics methods to answer the research questions. Generally, three types of research questions are utilized in scientometrics, including (i) Identifying important information, synthesizing the research area, (ii) Identifying research directions major in the field of research, and (iii) Identifying the network of scientific links and cooperation of the research community in the research field (social network structure of a scientific community) (Aria & Cuccurullo, 2017). A significant step in research design is determining the duration of the study. Scientometrics analysis can be performed over a long period to generalize the scientific picture of an area of study or over a shorter duration to clarify the field's development chronologically.

2.2 Business Process Management

Over the past decade, business process management (BPM) has become an important and indispensable field in organizations. The business process is known for a set of established and standardized principles, methods, and tools to improve management efficiency in agencies (Weske et al., 2004; Zerbino et al., 2021). In addition, the development of information technology, management science, and science and technology fields has helped improve the business management process in agencies (J. vom Brocke & Sinnl, 2011; Aktürk, 2021).

Business process management is a comprehensive set of standards for managing and transforming an organization's activities. Those standards can be developed based on the results obtained after the management innovation of the organization(J. Brocke, 2015). Developing that standard is generally based on the Restructuring process, that is, finding the strengths and weaknesses in the business management process and the set of improvement stages to create values for the business management process. Although restructuring can be regarded as a process that crosses the functional business boundary, restructuring is an improvement process based on actual results. For example, suppose the process is inappropriate and fails to bring high efficiency to the business process. In that case, the restructuring process helps to rearrange the operation stages so that an appropriate business management process can be formed and developed, bringing high efficiency to the business process in organizations (Tinnilä, 1995).

Figure 1. The essential process management cycle (J. Brocke, 2015)



Business process management can be accounted as a series of interrelated activities that cross-functional boundaries with inputs and outputs. Business process management is an essential issue that allows organizations to improve management efficiency in the performance of their mission (Machin, 2017). Business process management has functions: (1) Enables organizations to obtain more and more flexibility to accommodate the changing external needs; (2) Addressing the speed of promoting new products and services according to customer needs; (3) Helps reduce high costs in the process of operational management of the activities of agencies and organizations; (4) Create conditions to raise the reliability of the operation process in the eyes of other co-workers; (5) Helps determine the quality of products and services in terms of their consistency and capabilities (Sun et al., 2006).

BPM has been found vital in the past decades, and various organizations nowadays focus on defining and documenting business processes, identifying key performance indicators (KPIs) to measure and monitor process performance, and implementing means for continual process improvement and innovation (Vom Brocke et al., 2016). A successful business process management (BPM) organization requires a well-organized team to analyze, design, implement, optimize business processes and strategies across departments (Neubauer, 2009).

A business process can be defined as a set of related tasks or activities that results in a particular product or service. The processes can be broken down into three categories: business processes, operational processes, and management processes. Management processes are responsible for overseeing the system's operation. Support method (main support processes). Operational analysts or subject-matter experts engage in a series of tasks known as BPM that result in a graphical representation of an organization's processes (Wiechetek et al., 2017). Process management is also significantly supported by information technology and the open-source systems used to manage business processes (Jewer & Evermann, 2015). For applying technical solutions for managing cross-functional business processes, BPM has evolved as an effective management strategy and an efficient technology management strategy (Pridmore & Georgia, 2021). BPM is a well-known approach to improve organizational performance by way of improved process performance (Vugec, Vukšić, Bach, Jaklič, & Štemberger, 2020).

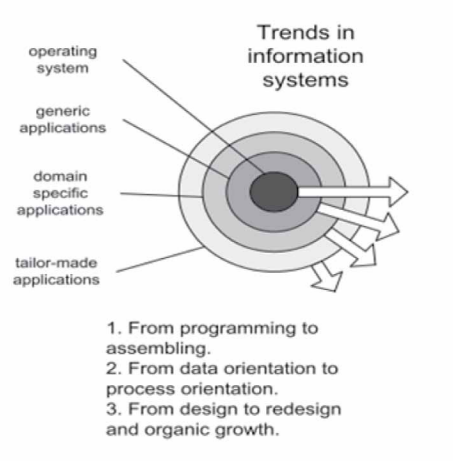
There are four main areas of business process management: (1) Business process modelling - process documentation, definition; graphic symbols: The development of information technology, has led to the development of business platforms, including modelling of the business management process, which has fostered to simulate, monitor and perform business process in the process of performing the organization's tasks; (2) Simulation of business processes: The ability to quantify the requirement for certain resources, identify available capabilities, and measure key performance indicators (KPIs) has been made possible by the realization of the demands for computer representation and the execution of business activities occurring in a real business environment; (3) Executing business processes: Business process management process models are used in the workflow system to implement business process logic; Business process monitoring: Work performance monitoring and automatic monitoring (lists, statistics); presenting data in various forms (tables, charts, to name but a few) in the management dashboard. The activities performed by the organization can be divided into different areas for management (Van Der Aalst et al., 2016).

A reference system is regularly proposed to help separate the complexity of an overall approach to business process management in order to perfect a BPM system to satisfy the work requirements for the following purposes: (1) Managing projects and programs: An operational process management process and approach should be established in the management of an organization's projects and programs so that all relevant issues in the BPM approach are addressed. protect and most accurately match the specific culture and strategy and context of the university; (2) Managing suppliers: It should be noted that a set of standards is requisite to evaluate the content and results achieved in the overall management of suppliers to ensure the product quality from suppliers in the overall BPM management process; (3) Managing complexity: It is necessary to separate the levels of complexity created by the holistic and comprehensive nature of BPM, and an overall picture of BPM to give direction to business

activities in universities is required; (4) Managing standards: Identify the elements of BPM that ought to be standardized throughout the university organization; develop standards for each element so that it can be carried out, compared and adjusted in the process of business management at universities to ensure output goals; (5) Managing strategies: Universities need to foster BPM strategies so that they could be materialized in a BPM roadmap in institutions, also, annual BPM audits need conducted for adjustments and enhancement to gain higher quality in the business management process for schools (M. R. and J. vom Brocke, 2015).

To show the relevance of business process management systems, the business process management trends can be identified in figure 2 (Aalst, 2004).

Figure 2. Trends relevant to business process management (Aalst, 2004)



It can be clearly seen that the management of business processes at organizations in general and universities, in particular, is critical to actively encourage a professional working environment, promoting standardization of a system of standards for business management process to form the distinctive culture of each university. Furthermore, the development of information technology has made it a more favourable condition to manage the business process at universities which are differentiated into each field and regularly evaluated. It also significantly contributes to detecting and adjusting unqualified sectors of business processes, thereby improving the operational quality of universities.

3. RESEARCH METHODOLOGY

This study used a general scientific mapping process that consisted of five phases: In this research, a general scientific mapping process engaging five phases is conducted: 1) Study design; 2) Data collection; 3) Data analysis; 4) Data visualization; and 5) Results interpretation (Borner et al., 2003; Zupic & Čater, 2015).

The underlying research question is identified during the research design phase as follows: What bibliometric data of scientific publications on the current establishment of business process management in universities?

Data collection, data filtering, and data cleaning are the three processes that make up the data collection phase:

Step 1: Data collection.

Today, there are five bibliographic databases that can be used to conduct bibliographic analysis, including: Web of Science (WoS), Scopus, Google Scholar, Microsoft Academic and Dimentions (G/ Tsadik et al., 2020). Among them, WoS and Scopus is the most comonly used for biometric analysis.

This study takes of Scopus database (http://www.scopus.com) as a search engine on account of the larger number of bibliographic documents than other databases (Duc, 2020). With search options for searching terms and syntax matching methods of this search engine including the keywords related to business process management: "Business Process Management in higher education"; "Business Process Management". These keywords are searched in the document's abstract, key words, or titles. This study retrieve Scopus data on 05/10/2022 with the following syntax, with the results of 1100 documents:

TITLE-ABS-KEY ("Business Process Management in higher education" OR "Business Process Management") AND PUBYEAR > 1999 AND PUBYEAR < 2023 AND (LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "ch") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ECON")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (EXACTKEYWORD, "Business Process Management") OR LIMIT-TO (EXACTKEYWORD, "Business Process") OR LIMIT-TO (EXACTKEYWORD, "Business Process Management (BPM)"))

Step 2: Data filtering.

By using titles, abstracts, and keywords to censor papers that are only loosely connected to the study questions, the author filters the data. There are 1082 documents still available.

Step 3: Data cleaning.

1082 documents downloaded needs to be cleaned (Ha et al., 2020) to consistent information in the collected data such as author's name, author's working agency, and so on has been corrected.

To conduct the data analysis, this study uses Scopus's available tools, VOSViewer and Biblioshiny software and Various analytic techniques have been applied to extract the information of the set of publications including: information of the publication collection has been summarized, and the annual number of publications is analyzed to derive development trends of the research field. The contribution of each country is based on the number of articles and citations was analyzed to determine what worked best.

4. RESEARCH RESULTS AND DISCUSSION

4.1 Overall Information and Research Trends

Tables 1 and 2 display the essential details regarding the dataset of articles. The collection includes 1082 articles in total, which were published between 2000 and 2020 in 300 different sources. The majority of them (362 articles) are from scientific journals and conference proceedings (603 articles). At the time of the study, there were 35517 references totaled, averaging 13.03 citations per document.

Table 1. Overall information about the data

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2000:2022
Sources (Journals, Books, etc)	300
Documents	1082
Annual Growth Rate %	10.36
Document Average Age	7
Average citations per doc	13.03
References	35517
DOCUMENT CONTENTS	
Keywords Plus (ID)	3803
Author's Keywords (DE)	2522
AUTHORS	
Authors	2357
Authors of single-authored docs	138
AUTHORS COLLABORATION	
Single-authored docs	163
Co-Authors per Doc	2.99
International co-authorships %	20.61
DOCUMENT TYPES	
Article	362
book chapter	75
conference paper	603
Review	34

Source: Analysis of the research team on the Biblioshiny tool

A total of 2357 authors (average 2.18 authors/publication) have contributed to the research and publications in this topic. In which there are 138 authors who publish their own research; of them, 163 have produced single-authored scientific articles, making up an impressive 14.78% of all publications. In comparison to other research in the area of business process management, this rate is relatively high. Scientific conferences make up the majority of research articles in this discipline (57.57% of the total). Only approximately 6% of the publications in the social sciences category are conference papers, according to the Scopus database (source https://www.scopus.com).

Table 2. Citation information of various categories of scientific products

Year	Number of documents	Citation number	Number of citations/documents
2000	4	38.75	1.76
2001	1	1.00	0.05
2002	3	5.00	0.25
2003	5	18.00	0.95
2004	1	35.00	1.94
2005	6	10.00	0.59
2006	17	36.94	2.31
2007	15	8.60	0.57
2008	23	22.22	1.59
2009	50	12.20	0.94
2010	38	41.16	3.43
2011	72	11.86	1.08
2012	72	18.82	1.88
2013	77	15.70	1.74
2014	74	11.54	1.44
2015	96	18.33	2.62
2016	80	11.44	1.91
2017	84	10.25	2.05
2018	88	13.16	3.29
2019	92	5.97	1.99
2020	97	6.91	3.45
2021	48	2.21	2.21
2022	35	0.34	

Figure 3. Annual number of publications and cumulative total citations

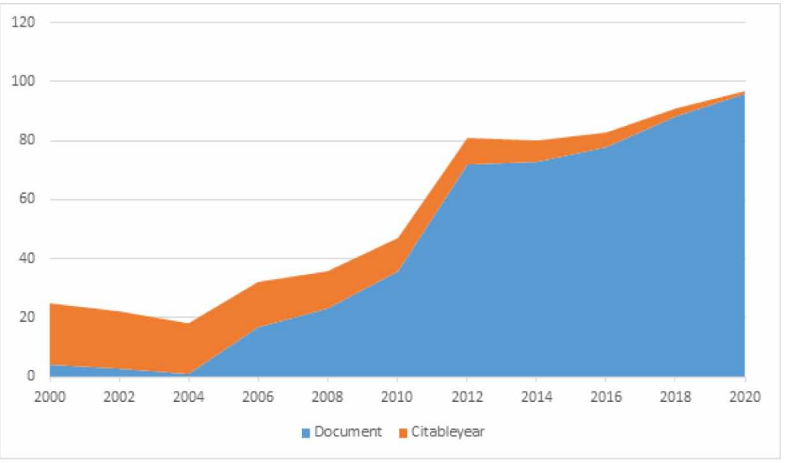


Figure 3 displays the annual publication count as well as the total number of citations for the BPM studies. The number of publications in this discipline is growing at a high rate each year, while this growth rate later fluctuates. The last ten years have seen an increase in scientists expressing interest in research on this subject, but the number of publications is considered to be negligible. The number of publications' citations has marginally risen.

4.2 Distribution by Country/Territory

Authors from 86 nations and territories contributed in the research on this subject, according to Scopus statistics. Table 3 provides information on the nations having five or more publications per year. When at least one author is documented with the name and address of the appropriate authority in a given nation, the number of publications per country is recorded. Germany is the most outstanding contributor with 241 published studies, equal to 22.2% with 3095 citations or 8.7% in total. Taking the second place of this list is still another United States with 92 works, standing at the third rank is the country from the Australia with 82 publications, followed by Brazil with 67 publications. The other countries in this list with the number of publications respectively are Italy (63), Netherlands (61); Austria (59); United kingdom (53); China (45); Belgium (42) and France are 37 publications; Portugal (32), the rest of the other countries have less than 30 publications in the last 22 years (2020 – 2022).

Table 3. List of 30 countries with the largest number of publications on business process management

No.	Nation	Number of publications	Number of citations	Rate of citation
1.	Germany	241	3095	12.8
2.	United states	92	2395	26
3.	Australia	82	2176	26.5
4.	Brazil	67	827	12.3
5.	Italy	63	1262	20
6.	Netherlands	61	1781	29.2
7.	Austria	59	841	14.3
8.	United kingdom	53	741	14
9.	China	45	599	13.3
10.	Belgium	42	570	13.6
11.	France	37	489	13.2
12.	Portugal	32	220	6.88
13.	Canada	25	512	20.5
14.	Switzerland	23	178	7.74
15.	Sweden	23	156	6.78
16.	Slovenia	22	1313	59.7
17.	Denmark	22	573	26
18.	Poland	21	97	4.62
19.	Liechtenstein	21	1540	73.3
20.	Czech republic	19	84	4.42
21.	Spain	16	130	8.13

Table 3 continued on next page

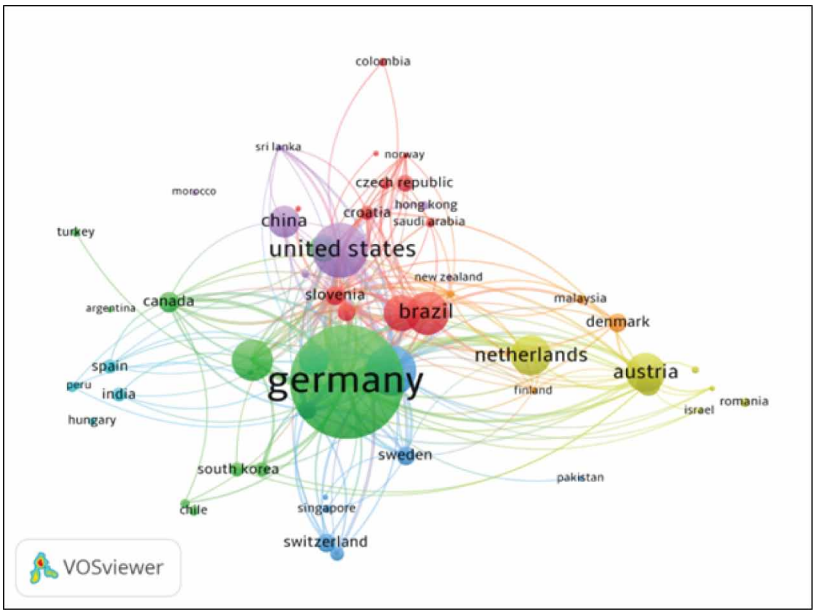
Table 3 continued

No.	Nation	Number of publications	Number of citations	Rate of citation
22.	South korea	16	215	13.4
23.	South africa	16	148	9.25
24.	India	16	160	10
25.	Croatia	16	285	17.8
26.	Russian federation	15	212	14.1
27.	Tunisia	14	31	2.21
28.	Greece	11	113	10.3
29.	Indonesia	10	34	3.4
30.	Chile	10	103	10.3

Source: Analysis of the research team on the Biblioshiny tool

It is noticeable that the most published countries in Figure 4, the larger the nodes represent, the larger number of publications of that country in the field of business process management.

Figure 4. Graph showing publication figures among countries (by VOSviewer)

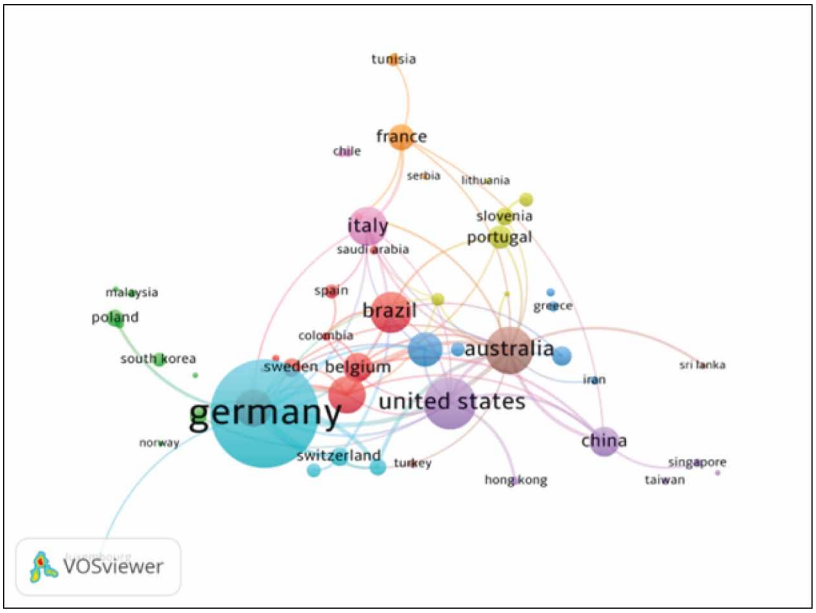


Publications with contributions from authors from Germany are recognized as having the greatest average rate of citations, with an average of 12,8 citations/publication, when evaluating the overall quality of national publications based on the average number of citations, followed by United states with 26 citations/publication, Australia (26.5 citations/publication)…. Thus, it is clear that the

countries showing the advantages in in research business management process are Germany; United States; Australia; Brazil; Italy.

Figure 5 depicts the network of international collaboration between nations in the area of business process management. The network is made up of nations that have worked together on at least one publication that has been made public. The number of papers each node has published is represented by its size, and the degree of cooperation between the two countries is indicated by the thickness of the links connecting them. Clusters of like colors are used to group together nations that frequently cooperate with one another. Research shows that authors come from 69 countries which experience the collaboration with other countries. Germany, the United Kingdom, Australia, Brazil, America, and Italy collaborate the most. Research cooperation in this area generally seems to be weak, despite evidence of international cooperation among nations.

Figure 5. The network of international cooperation between countries in research on business process management (by VOSviewer)



4.3 The Most Published Journals on Business Process Management

A number of sources have reported the authors' research on this topic. Table 4 displays a list of the sources that have been used the most (at least 20 publications).

Table 4. The list of 20 most published journals on business process management

No.	Sources	Articles
1.	Lecture notes in business information processing	388
2.	Business process management journal	116
3.	Decision support systems	26
4.	Handbook on business process management 2: strategic alignment, governance, people and culture, second edition	20

Table 4 continued on next page

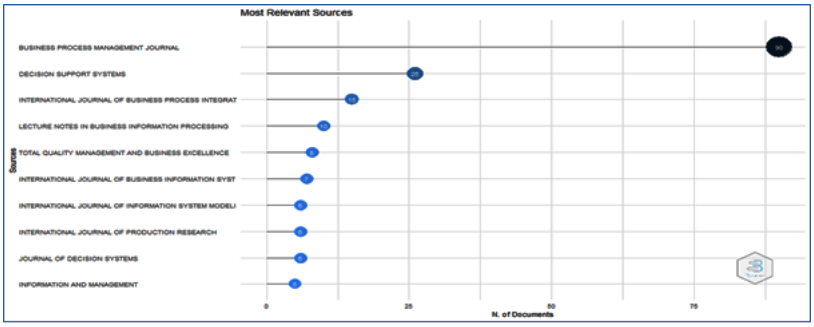
Table 4 continued

No.	Sources	Articles
5.	International journal of business process integration and management	15
6.	Proceedings of the international conference on industrial engineering and operations management	13
7.	Handbook on business process management 1: introduction, methods, and information systems	11
8.	Lecture notes in information systems and organisation	10
9.	International journal of production research	9
10.	International journal of business information systems	7
11.	Proceedings - 2013 ieee international conference on business informatics, ieee cbi 2013	7
12.	Total quality management and business excellence	7
13.	Iceis 2014 - proceedings of the 16th international conference on enterprise information systems	6
14.	Information and management	6
15.	International journal of information system modeling and design	6
16.	Journal of decision systems	6
17.	Proceedings - 13th ieee international conference on commerce and enterprise computing, cec 2011	6
18.	Tagungsband multikonferenz wirtschaftsinformatik 2014, mkwi 2014	6
19.	Emerald emerging markets case studies	5
20.	Ieee international conference on industrial engineering and engineering management	5

Source: The analysis of the research team on the tool Biblioshiny

Table 4 presents the top 20 journals that most actively publish on ness process management at universities, of which the Lecture notes in business information processing includes 388 articles; Business process management journal includes 116 articles, this is a specialized journal on operational process management; There are 6 journals and Proceedings with more than 10 articles within 22 years are: decision support systems (26 articles); international journal of business process integration and management (15 articles); Lecture notes in information systems and organisation (10 articles); Handbook on business process management 2: strategic alignment, governance, people and culture, second edition (20 articles); Handbook on business process management 1: introduction, methods, and information systems (11 articles); Proceedings of the international conference on industrial engineering and operations management(13 articles), the remaining ones published on business process management in the past 20 years are scattered in a wide range journals with the no more than 10 articles. This reveals that the number of publications in the past 20 years on business process management at universities poses a limit, while this is an area that needs further exploitation in the forthcoming future. Figure 6 presents the 10 most published journals on business process management at universities.

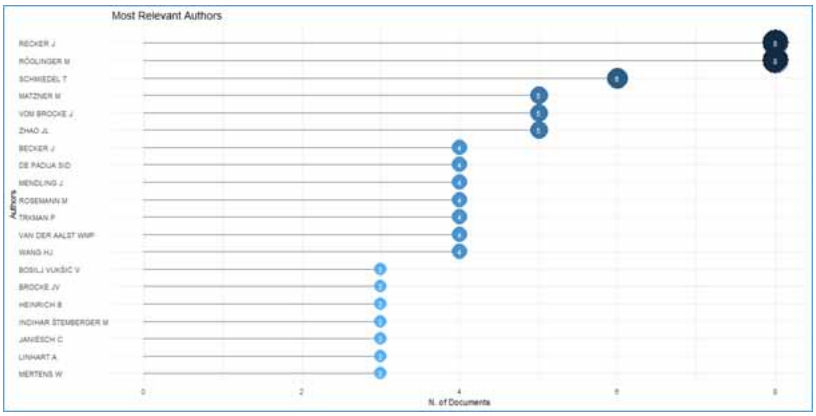
Figure 6. List of journals publish a majority of research on business process management at universities (by Biblioshiny)



4.4 The Most Contributing Authors

2357 authors have participated in research and publication on business process management in higher education as shown in Table 1, of which there are 138 publications with only one published author, shown in Figure 8 shows the 10 most published authors in the field of business process management in which the author who publishes at least in the top 10 is 10 publications, typically 2 authors are Jan Mendling (Humboldt-Universität zu Berlin: Berlin, DE, Germany) with 21 publications and Mathias Weske (University of Potsdam: Potsdam, DE) with 17 publications who have been recorded with the largest number of publications on this area, 15 publications. The following are 06 authors Van der aalst wmp (15); Becker j (13); Bandaraw and Loos P (12); Matzner M and Recker J and Röglinger M (11); Fettke P (10) who have published over 10 publications between 2000 and 2022.

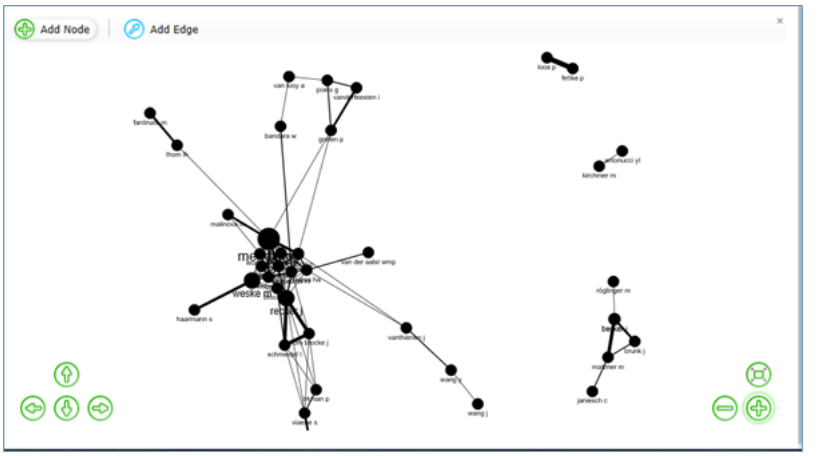
Figure 7. The author with the most publications (source: An analysis of the team on tool Biblioshiny)



Additionally, Figure 8 depicts the network of reciprocal collaboration for research activities for authors with at least two published works. Nearly all of the authors who originally appeared in Figure 7 are detectable in this network. In general, being similar to the networks between countries, this type of collaborative network is considered as being insignificant, predominantly focusing on small groups. The author JanRecker (University of Cologne, Germany) albeit 8 publications on this topic, with 05 on his own to public, the other 3 are the cooperation between him and three different authors. Theresa Schmiedel (University of Applied Sciences and Arts Northwestern Switzerland,

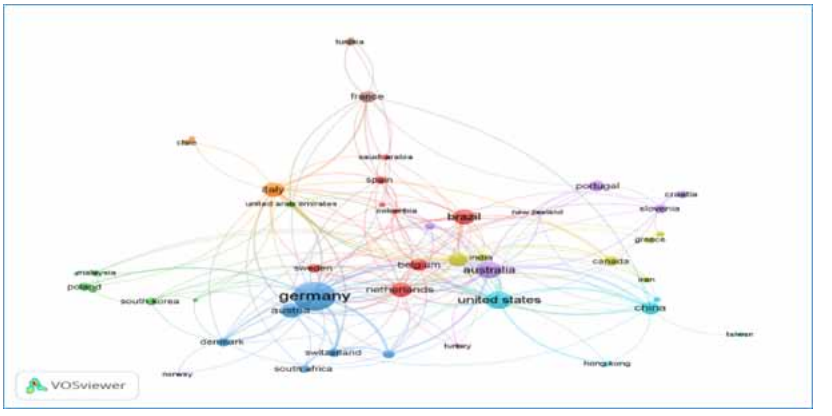
Switzerland) mainly collaborate with two others whose 6 publications including 02 single published publications, the remain 4 is the result with other 4 co-partners.

Figure 8. Cooperation network between authors on business process management (by Biblioshiny)



Similarly, research cooperation among authors in the network shown in Figure 9 implys that the analysis of collaboration among authors across countries in the publications shown in Figure 9 has not been extensive, in which yhe selection of publications with cooperation links of authors from 2 or more countries reveals that the link network on this topic of countries has not been extended, the linkage of academic networks on this topic is mainly accumulated in some countries with numerous publications on this field such as Germany; Australia; Italy; Canada, to name but a few.

Figure 9. The cooperation network between countries in research about business process management (by VOSviewer)



4.5. The Most Influential Studies

The information on the most influential studies shown in the most influential scientists and most influential publications is illustrated in Table 5.

Table 5. The most influential publications on research on business process management in universities

No.	Paper	DOI	Total Citations
1	Trkman p, 2010, int j inf manage	10.1016/j.ijinfomgt.2009.07.003	567
2	Rosemann m, 2015, handb on bus process management 1: introduction, methods, and inf systems	10.1007/978-3-642-45100-3_5	347
3	Mendling j, 2018, acm trans manage inf syst	10.1145/3183367	332
4	Trkman p, 2010, decis support syst	10.1016/j.dss.2010.03.007	309
5	Röglinger m, 2012, bus process manage j	10.1108/14637151211225225	271
6	Bai c, 2013, int j prod econ	10.1016/j.ijpe.2013.07.011	268
7	Arzu akyuz g, 2010, int j prod res	10.1080/00207540903089536	253
8	Hammer m, 2015, handb on bus process management 1: introduction, methods, and inf systems	10.1007/978-3-642-45100-3_1	233
9	Van der aalst w, 2012, acm trans manage inf syst	10.1145/2229156.2229157	233
10	Song m, 2008, decis support syst	10.1016/j.dss.2008.07.002	227
11	Evermann j, 2017, decis support syst	10.1016/j.dss.2017.04.003	193
12	Hung ry-y, 2006, total qual manage bus excellence	10.1080/14783360500249836	179
13	Sun sx, 2006, inf syst res	10.1287/isre.1060.0105	165
14	Brocke jv, 2016, int j inf manage	10.1016/j.ijinfomgt.2015.10.002	147
15	Vom brocke j, 2014, bus process manage j	10.1108/BPMJ-06-2013-0074	147
16	Harmon p, 2015, handb on bus process management 1: introduction, methods, and inf systems	10.1007/978-3-642-45100-3_3	139
17	Breuker d, 2016, mis quart manage inf syst	10.25300/MISQ/2016/40.4.10	124
18	Schmiedel t, 2014, inf manage	10.1016/j.im.2013.08.005	114
19	Montali m, 2010,	10.1007/978-3-642-14538-4_1	104
20	Conforti r, 2015, decis support syst	10.1016/j.dss.2014.10.006	103

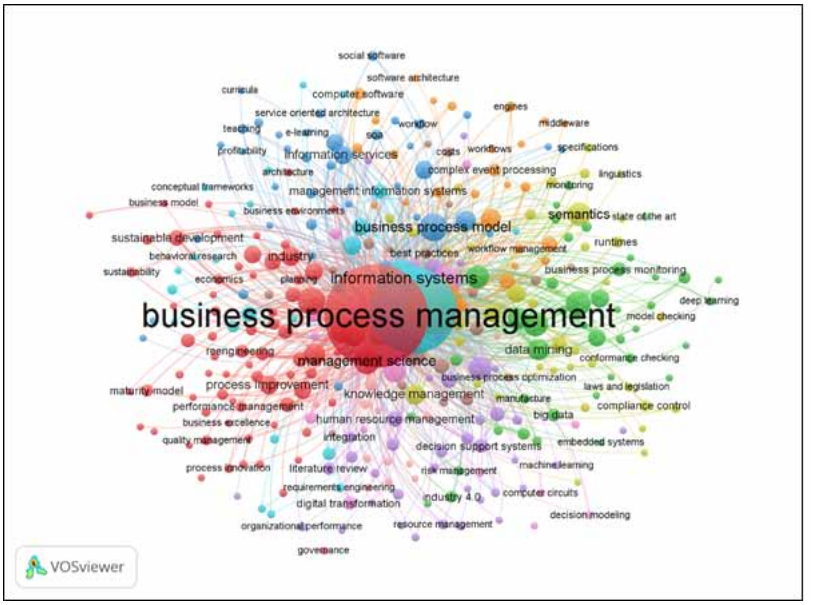
Source: The analysis of the researching team on tool Biblioshiny

These are the most cited 20 publications on business process management in which the article with the highest number of citations (567 citations recorded) is authored by PeterTrkman, University of Ljubljana, Slovenia, published influential factors in business management published on the International Journal of Information (ranked Q1 under the ScimagoJR system's standards https://www.scimagojr.com/) in 2020. The data in Table 5 indicates that research publications on business process management have drawn attention among scientists globally, and this is an important research issue to be studied to acquire new implications for agencies, organizations, and universities).

4.6 The Analysis of Key Words and Research Terms

The research team analyse the keywords detected in these publications to identify the fundamental research directions of the scholars shown in Figure 10.

Figure 10. The most common keywords found in the publications



The authors of the 1082 published papers suggested 3803 keywords for their works, and the Scopus database index added extra keywords for categorization (table 1). These keywords were evaluated by the study to determine the major scholarly research trends. Web services, change management, process improvement, service-oriented architecture, and other irrelevant terms have been removed from this document. Figure 10 displays the keywords illustrating business process management research trends. The linkages between keywords show how frequently those keywords appear together in publications, and the size of the keyword buttons shows how frequently those terms appear in publications. Highly related keywords are grouped into clusters with similar colors.

Analyze the appearance of keywords in the research and application, the examination of the keywords occurrence in researches and using publications related to business process management are interested in many different research trends by the author and the most attention is on business process management (980 times used in 1082 publications), there are some prominent keywords of interest in the research including BPM; business process; business processes; business process modelling, and so on; The last phrase is likely to be less outstanding consist of main key words such as process mining; process improvement; business process improvement, to name but a few.

4.7 Some Recommendations for the Business Management Process in Vietnam's Universities

The scientometrics on the business management process at universities appearing in the publications in Scopus shows that this is an appealing research trend among scientists worldwide. Many quality studies have proposed standards, processes, methods of performance management, and research results applied to organizations, businesses, and universities in developed countries such as Germany, Italy, Brazil, the USA, and China. These are the research trends that should be paid more attention to by the developing countries for more applications in universities and organizations regarding the activities of the business management process aiming to foster and ensure the education quality.

The research team from Vietnam, a developing country where the university systems are shifting to financial autonomy, the application of the studies on business management process have emerged as an acute and practical issue.

These are some recommendations for the activities of the business management process in institutions in Vietnam:

- **The first:** The scientist and scholars in Vietnam should pay more attention to the research of the implications of the papers on the business management process to offer appropriate adjustments to the developing context among universities currently in order to provide sufficient methodologies, standards, and business management process suitable with the domestic institutions and so that the research results could be applied in practice in the directions of autonomy and self-responsibility and appeal and take advantages of more talents, enhance the quality of those institutions in Vietnam.
- **The second:** The scientist in Vietnam should give more close and thoughtful attention to the international scholars with shared interests and research trends on business management process, generating a network of cooperation between Vietnam and developed nations experienced in this sector, such as Germany, Italia, the USA, and China, etc. for more information and experience exchanges, and collaborations of research on business process management, to actively innovate the business management process in the national institutions.
- **The third:** The scholars working on trends of business process management should consider the institutions those the scientists have released publications on this issue, thereby creating a cooperative relationship between the universities to implement the research topic, release the publications on business process management for Vietnam's universities as well as support these schools to obtain more knowledge and experience about the business process from the prestigious institutions in the world.
- **The fourth:** The scientometrics results will allow the Vietnamese scientists who show interest in forming their research trends on business process management need to give heed to the keywords and prominent keywords phrases to be able to search for documents and results of scientists around the world on this research trends easily and based on results of scientific measurements they can connect and cooperate with the world's leading researchers in this field to exchange and cooperate, and at the same time can grasp list of top journals published on the topic to have more favourable conditions to publish individual publications relevant to this research trends.

CONCLUSION

Vietnam, in particular, and developing countries, in general, all own universities gradually transitioning from the state subsidy mechanism to an autonomous mechanism like other international institutions. Nevertheless, even so, here is the issue: applying the original research results of the world's authors on business process management to the management of universities in Vietnam is claimed not to be effective as expected. Therefore, it is necessary to transition between scientists in Vietnam doing research and adjusting to the Vietnamese context to be able to apply those research results to innovation management of business processes at different universities to gain more productivity. The results of the examination of scientometrics from 1082 publications on business processes management in the Scopus database have analyzed the features of the publications; the research network among the nations and researchers, the most common keywords in the research trends, the most influential scholars of this theme, the most common journals on business processes management in universities. These research results would permit the Vietnamese scholars to obtain more information about the authors, publications, journals, keywords, and the active institutions of this area to pose more accessible opportunities for sharing, connecting, and generating a network of cooperation for new research results to encourage more applications among the Vietnamese institutions so that the business processes management can be more effective.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

Aktürk, C. (2021). Artificial intelligence in enterprise resource planning systems: A bibliometric study. *Journal of International Logistics and Trade*, *19*(2), 69–82. doi:10.24006/jilt.2021.19.2.069

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. doi:10.1016/j.joi.2017.08.007

Bellis, N. De. (2012). Bibliometrics and Citation Analysis, from the Science Citation Index to Cybermetrics. *Toruńskie Studia Bibliologiczne, 5*(1).

Borner, K., Chen, C., & Boyack, K. W. (2003). Visualizing Knowledge Domains. In *Annual Review of Information Science and Technology* (pp. 179–255). ASIS&T.

Broadus, R. N. (1987). Toward a definition of "bibliometrics.". *Scientometrics*, *12*(5–6), 373–379. doi:10.1007/BF02016680

Brocke, J. (2015). Handbook on Business Process Management 1. In Handbook on Business Process Management 1. doi:10.1007/978-3-642-45100-3

Brocke, M. R. & Vom, J. (2015). The Six Core Elements of Business Process Management. In *Handbook on Business Process Management 1: Introduction, Methods, and Information Systems* (pp. 1–727). 10.1007/978-3-642-45100-3

Bubenik, P., Capek, J., Rakyta, M., Binasova, V., & Staffenova, K. (2022). Impact of Strategy Change on Business Process Management. *Sustainability*, *14*(17), 11112. doi:10.3390/su141711112

Charlton, B. G., & Andras, P. (2007). Evaluating universities using simple scientometric research-output metrics: Total citation counts per university for a retrospective seven-year rolling sample. *Science & Public Policy*, *34*(8), 555–563. doi:10.3152/030234207X254413

Chiu, W. T., & Ho, Y. S. (2007). Bibliometric analysis of tsunami research. *Scientometrics*, *73*(1), 3–17. doi:10.1007/s11192-005-1523-1

Ding, Z. (2017). Bibliometrics Analysis of Typical SCI Journals in Natural Medicines by Use of WoS. *Serials Review*, *43*(2), 130–136. doi:10.1080/00987913.2017.1300045

Duc, B. P. (2020). A spike in the scientific output on social sciences in Vietnam for recent three years: Evidence from bibliometric analysis in Scopus database (2000– 2019). *Journal of Information Science*, *1*, 2020.

Gulledge, T. R. Jr, & Sommer, R. A. (2002). Business process management: Public sector implications. *Business Process Management Journal*, *8*(4), 364–376. doi:10.1108/14637150210435017

Ha, C. T., Thao, T. T. P., Trung, N. T., Huong, L. T. T., Van Dinh, N., & Trung, T. (2020). A Bibliometric Review of Research on STEM Education in ASEAN: Science Mapping the Literature in Scopus Database, 2000 to 2019. *Eurasia Journal of Mathematics, Science and Technology Education*, *37*(1), 179–225. doi:10.29333/ejmste/8500

Jewer, J., & Evermann, J. (2015). Enhancing learning outcomes through experiential learning: Using open-source systems to teach enterprise systems and business process management. *Journal of Information Systems Education*, *26*(3), 187–201.

Jurczuk, A. (2021). Barriers to implementation of business process governance mechanisms. *Engineering Management in Production and Services*, *13*(4), 22–38. doi:10.2478/emj-2021-0029

Khudzari, J., Kurian, J., Tartakovsky, B., & Raghavan, G. S. V. (2018). Bibliometric analysis of global research trends on microbial fuel cells using Scopus database. *Biochemical Engineering Journal*, *136*, 51–60. doi:10.1016/j.bej.2018.05.002

Ly, P. T. (2015). *The problem of bibliographic metrology, scientific metrology, information metrology*.

Machin, C. A. (2017). Implications of business process management for operations management. *International Journal of Operations & Production Management*, *37*(2), 226–255.

Neubauer, T. (2009). An empirical study about the status of business process management. *Business Process Management Journal*, *15*(2), 166–183. doi:10.1108/14637150910949434

Plattfaut, R. (2022). On the Importance of Project Management Capabilities for Sustainable Business Process Management. *Sustainability*, *14*(13), 7612. doi:10.3390/su14137612

Sun, S. X., Zhao, J. L., Nunamaker, J. F., & Sheng, O. R. L. (2006). Formulating the data-flow perspective for business process management. *Information Systems Research*, *17*(4), 374–391. doi:10.1287/isre.1060.0105

Tinnilä, M. (1995). Strategic perspective to business process redesign. *Management Decision*, *33*(3), 3–16. doi:10.1108/00251749510085021

Tsadik, G. D., Berhane, Y., Worku, A., Luo, D., Cheng, Y., Zhang, H. H., Ba, M., Chen, P., Li, H., Chen, K., Sha, W., Zhang, C., Chen, H. H., Direktorat Jenderal Pencegahan dan Pengendalian Penyakit, Ansar J, Dwinata I, M. A., Agus Triono, I. H., Fitriayani, Y., Wuni, C., Wolfe, D. T., & Haris, A. (2020). Software tools for conducting bibliometric analysis in science: An up-to-date review. *El Profesional de la Información*, *29*(1).

Van Der Aalst, W. M. P. (2004). Business Process Management : A personal view. *Business Process Management Journal*, *10*(2). doi:10.1108/bpmj.2004.15710baa.001

Van Der Aalst, W. M. P., La Rosa, M., & Santoro, F. M. (2016). Business process management: Don't forget to improve the process! *Business & Information Systems Engineering*, *58*(1), 1–6. doi:10.1007/s12599-015-0409-x

Viriyasitavat, W., Da Xu, L., Bi, Z., & Sapsomboon, A. (2020). Blockchain-based business process management (BPM) framework for service composition in industry 4.0. *Journal of Intelligent Manufacturing*, *31*(7), 1737–1748. doi:10.1007/s10845-018-1422-y

vom Brocke, J., & Sinnl, T. (2011). Culture in business process management: A literature review. *Business Process Management Journal*, *17*(2), 357–378. doi:10.1108/14637151111122383

Vom Brocke, J., Zelt, S., & Schmiedel, T. (2016). On the role of context in business process management. *International Journal of Information Management*, *36*(3), 486–495. doi:10.1016/j.ijinfomgt.2015.10.002

Waltman, L., & Noyons, E. (2018). Bibliometrics for research management and research evaluation: A brief introduction. In *CWTS Meaningful metrics*. Leiden University.

Weske, M., Van Der Aalst, W. M. P., & Verbeek, H. M. W. (2004). Advances in business process management. *Data & Knowledge Engineering*, *50*(1), 1–8. doi:10.1016/j.datak.2004.01.001

Wiechetek, Ł., Mędrek, M., & Banaś, J. (2017). Business Process Management in Higher Education. The Case of Students of Logistics. *Problemy Zarzadzania*, *15*(4 (71)), 146–164. doi:10.7172/1644-9584.71.10

Zerbino, P., Stefanini, A., & Aloini, D. (2021). Process science in action: A literature review on process mining in business management. *Technological Forecasting and Social Change*, *172*, 121021. doi:10.1016/j.techfore.2021.121021

Zou, X., Yue, W. L., & Le Vu, H. (2018). Visualization and analysis of mapping knowledge domain of road safety studies. *Accident; Analysis and Prevention*, *118*, 131–145. doi:10.1016/j.aap.2018.06.010 PMID:29958121

Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, *18*(3), 429–472. doi:10.1177/1094428114562629

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