Cloud Based Business Process Modeling Environment – The Systematic Literature Review

Anna Sołtysik-Piorunkiewicz(✉) and Patryk Morawiec

University of Economics in Katowice, 1 Maja 50 Street, 40-287 Katowice, Poland
anna.soltysik-piorunkiewicz@uekat.pl,
patryk.morawiec@edu.uekat.pl

Abstract. The article presents results of systematic literature review about business process modeling environment based on a cloud computing. The research methodology is evolved. In this paper the research set of 3901 articles is presented and examined. The sources were used for analyses came from Scopus, Web of Science, and EBSCOhost databases. The aim of the paper is to show the impact of cloud computing environment on business process modeling based on literature review. The research subject area is limited to *Computer science* category in cloud computing, business process modelling, and business process management subcategories. The research date set was limited to 313 items based on chosen literature sources indexed from year 2009 to 2020. The development of cloud based models in business process modelling and management, known as BPaaS, eBPM, and BPMaaS are described. The paper shows the state-of-art of business process lifecycle management and presents some classic methods of usage in modeling tools based on BPMN notation, UML, and Petri nets notations. The research methodology uses the different methods of data gathering and searching algorithms, with computer programming. The final findings based on the research questions (RQ1–RQ6) are described and presented in tables and on figures. The conclusion with future research ideas have been shown.

Keywords: BPMN · Cloud computing · Process modeling · BPaaS · Petri nets

1 Introduction

The cloud computing environment have some basic characteristics which are described in context of general essentials features, service models, and deployment models [16]. The impact of cloud computing is shown as a one of the trends in organizational strategies development of new business models [12, 13], and the methods of business process management and business process modelling are changing by cloud for improving business process lifecycle competitiveness in organization management, reducing costs and increasing flexibility of business processes. Cloud computing can offer many opportunities to improve business processes management in organization and use information

T.-P. Hong et al. (Eds.): ACIIDS 2021, CCIS 1371, pp. 416–428, 2021.
https://doi.org/10.1007/978-981-16-1685-3_34

technology more efficiently. The aim of the paper is to show the impact of cloud computing environment on business process modeling and management based on literature review. The research dataset was based on Scopus, Web of Science, and EBSCOhost literature sources indexed during period of time 2009–2020. The structure of the paper is divided into five chapters. Chapter two presents the study of Business Process Management Systems background. There are shown some classic methods of business process management and tools based on BPMN notation, UML, and Petri nets notations as well. These methods are described in chapter three. The chapter four shows the cloud based models which have the impact on business modelling methods, and named in literature as BPaaS, eBPM, and BPMaaS. The research methodology was described in chapter five. According to the literature review two hypotheses were formulated, i.e.: H1: Cloud solutions influence the development of business processes in project lifecycle area in context of usage business process modeling tools; H2: Cloud solutions influence the development of business process management. The research methods were used with searching algorithms based on data collection, with computer aided tools. The findings have been presented in tables and on figures as well. The final chapter shows the conclusion and future research topics.

2 Business Process Lifecycle and Business Process Management

Business process is defined as *a series or network of value-added activities, performed by their relevant roles or collaborators, to purposefully achieve the common business goal* [15]. According to Bitkowska [4] a business processes are decomposable to elementary activities level, having clearly defined entry and exit limits integrated with organization, process owner, measurable goals, quantitative, qualitative and valuable efficacy measures, and provides added value. Business processes management in organization have to introduce an iterative procedure of process lifecycle [9]. Description of Oracle's business process lifecycle is shown in Table 1.

Table 1. Business process lifecycle according to Oracle

Phase	Activities	Activities area
Business process analysis	- Business process identification - Business processes maps development - Detailed modeling with visual notation use - Process efficacy and quality planning	Modeling, simulation
Business process execution	- Implementation and execution of implemented processes	Implementation, development
Business process monitoring	- Gathering business processes measures value - Reporting - Assessment of business processes impact on organization	Monitoring, improvement

Source: Own work based on [9]

Business processes can be divided into 3 groups [9]:

– Management processes – processes of planning, development goals setting.

– Operational processes – processes related to organization activity, leading to product/service creation.
– Supporting processes – simulation management and operational processes effectively.

IT solutions for business process management (BPMS - Business Process Management Systems) are designed to complex management of existing business processes in organization and also for its continuous optimization and improvement. BMPS process optimization functionality includes following features [14]: eliminate duplicated activities and tasks, removing discontinuities in process flow, eliminate downtimes and delays in process realization, and support for quality management models.

3 Business Processes Modeling – Classic Approach

Gawin & Marcinkowski presented 16 selected business processes modeling standards divided into 2 main categories adapted visual modeling standards and dedicated visual modeling standards [10]. Below are characterized some of the most popular of them with particular emphasis of BPMN notation.

3.1 BPMN

BPMN stands as Business Process Model and Notation, is graphic standard for representation of business process, created and developed by Object Management Group (OMG). Current version of BPMN standard (2.0) was introduced in 2011 and it's available on-line at www.omg.org as an open standard for everyone [8]. One of important aspects of using BPMN notation is the possibility to transform visual model into executable file based on XML tags. It's realized with use of Business Process Execution Language (BPEL) technique [19]. A BPMN core and layer structure is presented in [18]. BPMN 2.0 notation is organized into 4 diagrams: Process diagram, collaboration diagram, choreography diagram and conversation diagram. In Table 2 each of diagrams is briefly described.

Table 2. Business process model and notation diagram types

Diagram	Purpose	Description
Process diagram	Visualization	Built to illustrate advanced subprocesses, tasks and other objects aspects
Collaboration diagram	Communication	Communication exchange between business process participants
Choreography diagram	Interaction	Built to coordinate business process participants interaction
Conversation diagram	Interaction	Interaction aggregation between business partners

Source: Own work based on [10] and [18]

Table 3. Detail level of business processes model

Model type	Description
Illustrative model	Shows general business process course, without technical aspects like conditional flow parameters, tasks and activities types, undeveloped subprocesses, data objects are not presented on a model
Analytical model	Shows evaluation of executable process implementation works. Activities and tasks types are specified, developed subprocessed, data objects are shown without definition on a model
Executable model	Used for executable process precise description, all objects and parameters are shown on a model with their definitions

Source: Own work based on [8]

According to [8] in business process model can exists 3 levels of model detail described in Table 3.

BPMN standard gained popularity due to its simplicity, versatility and openness. Simplicity of this notation is not limiting it's possibilities to create complex models and additionally provides better clarity and legibility both for business owners, project management team and also technical staff.

3.2 Other Solutions

UML with Profile for Business Modeling

In software engineering a standard to model various phenomena e.g. data flow, sequence, use cases in system development is Unified Modeling Language – a notation consisting of 13 main diagrams and 4 abstract diagrams.

From all UML diagrams can be distinguished an activity diagram and state diagram. These types of diagrams can be implemented in business processes modeling. Activity diagram is a type of behavioral diagram consists of activities, actions, flows (control flow, object flow) and nodes. Similarly to BPMN it exists also swim lanes and partitions. State diagram (state machine diagram) is also example of behavioral diagram, it shows system states and events in system that cause transition from one state to another [25]. A state is defined by the object value of its attributes and relationship between another objects. Event is changing the value of an object state, it takes place at certain point in a time and the state of an object determines a response to event. A transition is a relationship representing changing state of an object to another state [7].

Petri Nets and Event-Driven Process Chain

The concept of communication between asynchronous components of computer system was introduced in 1962 by Carl Adam Petri in his PhD thesis titled *Komunikation mit Automaten* [20]. Nowadays Petri nets based on mathematical foundations are used commonly to model various phenomena, including also business processes. Petri net bases on 3 dependencies which are: Sequence, Alternative, Parallel sequence.

In business processes modeling Petri nets are mostly used for searching dependencies between flow objects and to indicate alternative courses [6]. According to Pasamonik use of Petri nets in business processes modeling is the most precise and deterministic due to formal mathematic model base and it should be used for detailed notation and process control in organization [19].

Event-driven Process Chain is simplified Petri net notation, more elastic and easier to understand than classic Petri net. EPC notation is based on events and activities elements and connections between them. Example of EPC process is used in ARIS notation [3]. Events in EPC notation are responsible for defining precondition and postcondition of a function. For decision making, there are used logical operators. Every EPC process starts with starting event, ends with ending event and have limitations as follows [2]: events can't make OR/XOR decisions; additional process only can connect to EPC function; events have to be linked with AND operator; and for decision making functions can be associated with all logical operators (AND, OR, XOR).

4 Cloud Environment for Business Processes Modeling

4.1 Business Process as a Service

BPaaS is relatively new concept of modeling business processes in a cloud environment. Solutions also known as BPMC (Business Process Management Cloud), provides functionality of business processes modeling, optimization, implementation, monitoring and reporting. There is no difference in functionality between classic on-premises BPMS solutions and BPMC, different is only the way of sharing, development, improvement and scalability for organization and end users [11].

According to Gzik [11], BPaaS is an overarching model over IaaS, PaaS and SaaS model of cloud computing integrating services derived from submodels [11].

BPMC software should follow 5 main features [5]: (1) User experience based - to simplify complex and challenging activity of business processes modeling; (2) Be document capable - due to critical character of documentation in business processes modeling. Modeled process will be better understandable with clear and simple documentation; (3) Provides teamwork opportunity - access to projects by team regardless of time and place; (4) Process library - possibility to archive work, versioning and quickly reengineering existing legacy processes; and (5) Support for BPMN 2.0 notation - avoid outdated notation use for better communication and create understandable processes.

Modeling business processes in cloud environment can have positive impact on project success [17].

4.2 Elastic Business Process in BPMaaS

Business Process Management requires high quality of software services, and the organizations are nowadays able to react rapidly to changing demands for computational resources. The BPM in the cloud gave the opportunity to grow up the flexibility of the business process management. The issues of cloud model environment development covers the architecture of an elastic Business Process Management System in context of

existing work on scheduling, resource allocation, monitoring, decentralized coordination, and state management for elastic processes [24], i.e., processes which are carried out using elastic cloud resources. The elastic business process management (eBPM) approach evaluated in the cloud and the new model development has been discovered as BPMaaS (BPM as a Service) [22, 23], which have the opportunity to complete business processes in the cloud as well as an application's software, and hardware infrastructure, going through the idea of 'Everything as a Service'. There are a lot of benefits showed in case studies of the software solutions supporting BPM [20, 21], as an improvement factors of QoS in eBPM.

5 Research Methods and Findings

5.1 The Research Hypotheses

Based on the literature review of business process in cloud environment the following research hypotheses were formulated:

H1: Cloud solutions influence the development of business processes in project lifecycle area in context of usage business process modeling tools.
H2: Cloud solutions influence the development of business process management.

According to hypotheses the following research questions were formulated:

RQ1: What research areas/categories are linked with business processes modeling?
RQ2: What search phrases are linked with business processes modeling?
RQ3: What research areas/categories are linked with business processes management?
RQ4: What search phrases are linked with business processes management?

Additional research questions were formulated according to the character of study:

RQ5: What are the most common source publication types about related search queries?
RQ6: What is the current trend of literature publications related to research topic and when was the greatest interest of topic?

5.2 The Research Methodology - A Systematic Literature Review

The research methodology using in systematic literature review is evolved. A proposed research methodology based on systematic literature review study was conducted including scientific databases Scopus, Web of Science and EBSCOhost Academic Search Ultimate. The methodology [1] was adapted to perform this study and it's shown on a Fig. 1. There are some steps of the research methodology, including study design, selection of accessible full-text scientific database, formulate queries and search limitation, data collection and date set preparation, dataset evaluation, and summarization and conclusions.

The method of the study was based on literature review of business processes in cloud environment. The systematic literature review was designed and performed in

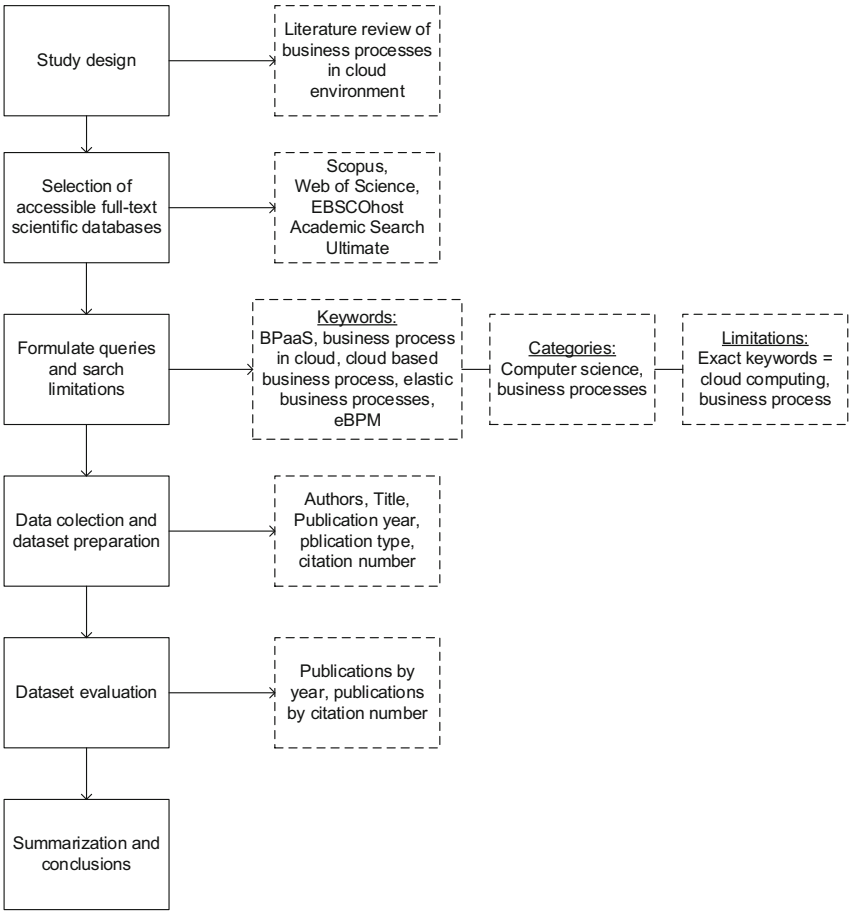


Fig. 1. A systematic literature review research methodology. Source: Own work

context of categories of research areas of cloud computing, business process modelling, and business process management.

The dataset was developed based on group of good known and the most cited sources from literature data bases for researchers and experts in studied area, i.e.: Scopus, Web of Science, and EBSCOhost.

Search keywords were proposed as follow: 'BPaaS', 'business processes in cloud', 'cloud based business processes', 'elastic business processes', 'eBPM'.

The next step was based on queries analysis with searching algorithm, and then the review of dataset was performed. The dataset has been limited, and then the research findings has been evaluated. The research findings were summarized and concluded.

5.3 Research Findings

The research findings were focused on queries results based on dataset from Scopus, Web of Science, and EBSCOhost published between 2009 and 2020. Search results are presented in Table 4. The amount of papers and literature sources were classified due to searching keywords. The chosen databases with sources, keywords, and number of articles were listed in Table 4. Research results were listed in 3901 items: 1041 items from Scopus, 2805 items from Web of Science, and 55 items from EBSCOhost.

Table 4. Databases search results

Database	Keyword	Number of articles
Scopus	"BPaaS"	68
	"business process in cloud"	475
	"cloud based business processes"	286
	"elastic business processes"	207
	"eBPM"	5
		∑1041
Web of science	"BPaaS"	31
	"business process in cloud"	1662
	"cloud based business processes"	1030
	"elastic business processes"	79
	"eBPM"	3
		∑2805
EBSCOhost	"BPaaS"	3
	"business process in cloud"	46
	"cloud based business processes"	6
	"elastic business processes"	0
	"eBPM"	0
		∑55
Summary		∑3901

Source: Own work

The H1 hypothesis can be confirmed in results of the query related to 'BPaaS', 'business processes in cloud', and 'cloud based business processes' phrases. Answers to research questions (RQ 1, RQ 2) related to H1 hypothesis indicate it exist related papers indexed in all searched databases. Hypothesis H2 can also be confirmed due to results of query (RQ 3, RQ 4) related to 'elastic business processes' and 'eBPM' phrases.

Limitations in search was subject area limited to *Computer science* category, and keywords were limited to cloud computing, business process modelling and business process management. Exact search queries were as follows.

1. For Scopus database:

   - TITLE-ABS-KEY(BPaaS) AND (LIMIT-TO(SUBJAREA,“COMP”))
   - TITLE-ABS-KEY(business processes in cloud) AND (LIMIT-TO(SUBJAREA,“COMP”)) AND (LIMIT-TO(EXACTKEYWORD,“Business Process”))
   - TITLE-ABS-KEY(cloud based business processes) AND (LIMIT-TO (SUBJAREA,“COMP”)) AND (LIMIT-TO(EXACTKEYWORD,“Business Process”))
   - TITLE-ABS-KEY(elastic business processes) AND (LIMIT-TO(SUBJAREA,“COMP”))
   - TITLE-ABS-KEY(eBPM) AND (LIMIT-TO(SUBJAREA,“COMP”))

2. For Web of Science database:

   - TOPIC: (BPaaS): Refined by: WEB OF SCIENCE CATEGORIES: (COMPUTER SCIENCE INFORMATION SYSTEMS OR COMPUTER SCIENCE THEORY METHODS OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS) Indexes = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Timespan = All years
   - TOPIC: (business process in cloud) Refined by: WEB OF SCIENCE CATEGORIES: (COMPUTER SCIENCE THEORY METHODS OR COMPUTER SCIENCE INFORMATION SYSTEMS OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS) Indexes = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Timespan = All years
   - TOPIC: (cloud based business processes) Refined by: WEB OF SCIENCE CATEGORIES: (COMPUTER SCIENCE INFORMATION SYSTEMS OR COMPUTER SCIENCE THEORY METHODS OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS) Indexes = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Timespan = All years
   - TOPIC: (elastic business processes) Refined by: WEB OF SCIENCE CATEGORIES: (COMPUTER SCIENCE THEORY METHODS OR COMPUTER SCIENCE INFORMATION SYSTEMS OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS) Indexes = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Timespan = All years
   - TOPIC: (eBPM) Refined by: WEB OF SCIENCE CATEGORIES: (COMPUTER SCIENCE INFORMATION SYSTEMS OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS) Indexes = SCI-EXPANDED, SSCI,

A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Timespan = All years.

Search queries for EBSCOhost database were not able to export. Search query in Web of Science database for 'business process in cloud' and 'cloud based business processes' keywords gave to many various results, so it wasn't taken into account. After removing 445 duplicate records between databases and between keywords, considered number of articles to final selection was 763. After manual selection of left articles, total number of selected articles is 313. Schema for article acceptance is presented on Fig. 2.

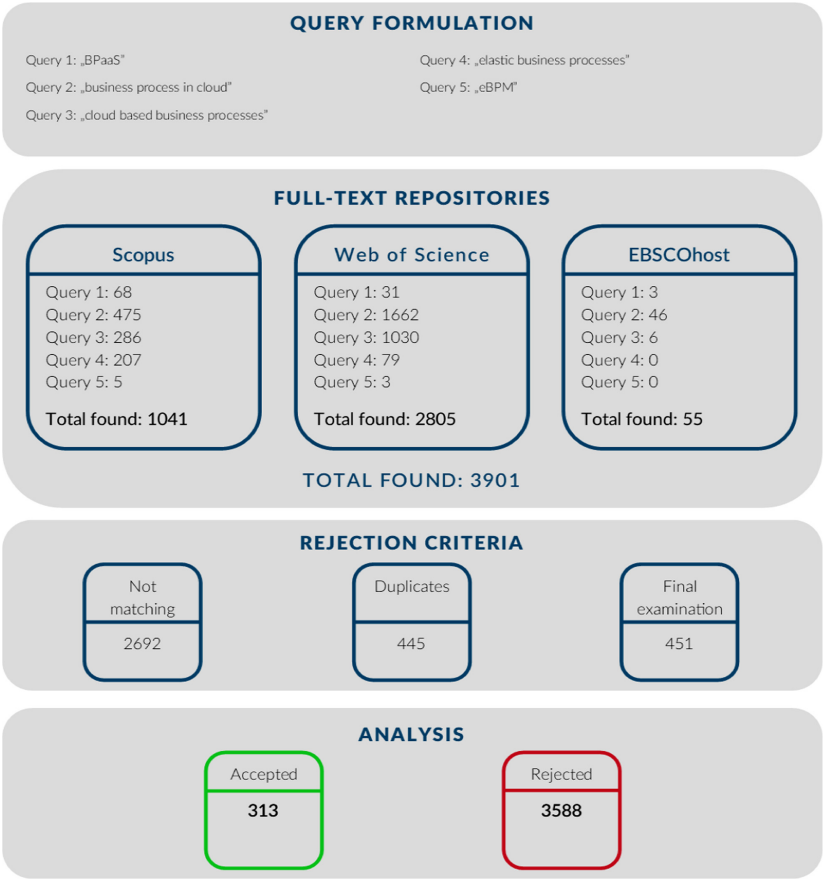


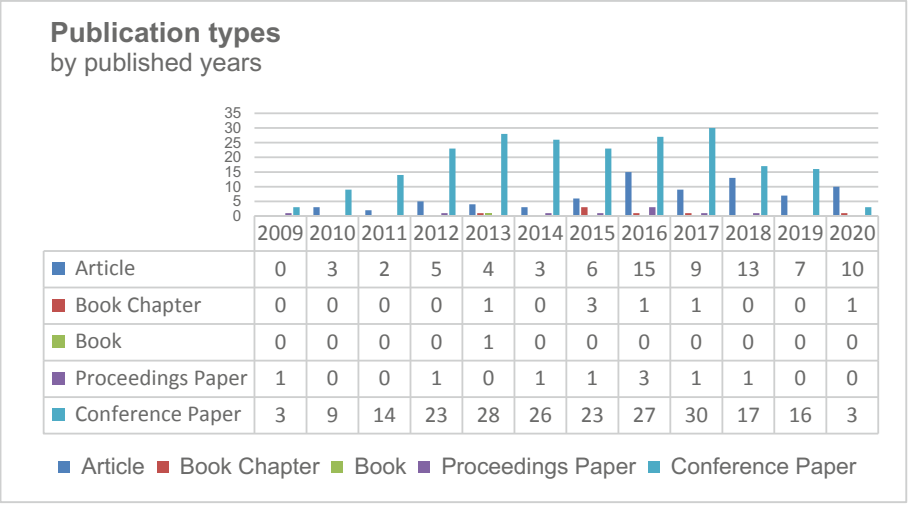
Fig. 2. Selection papers schema. Source: Own work based on [2]

The selection process was based on three rules as follows:

(1) studies highly relevant to business process management in cloud environment. Researches only partially related to the both topics e.g. cloud security were rejected;

(2) articles about general topic were rejected e.g. “32nd International Conference on Information System 2011”;
(3) final decision about article relevancy acceptance was based on a title.

The chart of selected papers over time with specification of publication types is presented on Fig. 3.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Article	0	3	2	5	4	3	6	15	9	13	7	10
Book Chapter	0	0	0	0	1	0	3	1	1	0	0	1
Book	0	0	0	0	1	0	0	0	0	0	0	0
Proceedings Paper	1	0	0	1	0	1	1	3	1	1	0	0
Conference Paper	3	9	14	23	28	26	23	27	30	17	16	3

Fig. 3. Publication types by year. Source: Own work

As it’s shown on Fig. 3, the most popular publication types are conference papers (219 papers) and articles (77 papers), which is answer to RQ5. The reasons of this popularity may be short form of this kind of publications with comparison of books and other longer and more complex forms of publications, with in connection with the novelty of the topic seems understandable.

The greatest interest in research topic can be observed in 2016–2017 period. Currently, there is a downward trend which is an answer to RQ6.

Selected papers were published between year 2009 and 2020, and most of them was cited 1 time (46 papers) excluding missing data. The most cited article have 95 citations.

6 Conclusions

Business processes modeling is an important issue in organizations. Eliminating bottlenecks and malfunctioning processes can influence on organization performance and it’s helpful in ensuring proper functioning of organization at all and individual departments.

Cloud computing as a technology based on availability upon requests seems to be good environment for business processes modeling and simulations.

The aim of the paper was to investigate the current trends in scientific literature about cloud based business processes modeling environment. To achieve the chosen

goal, a systematic literature review method were performed. During the research it was formulated hypotheses H1 and H2 about the impact of cloud solutions on business processes modeling and business processes management, and accuracy of research study. Hypotheses were verified with the help of research questions. Both hypotheses H1 and H2 was verified positively due to literature review results and showed in Table 4 and on Fig. 3. The described study have some limitation, so the further research need to be focused more on showing the state-of-art in the field, and the impact of cloud computing on modeling and simulation tools development in IT project management.

References

1. Abideen, A.Z., et al.: Mitigation strategies to fight the COVID-19 pandemic—present, future and beyond. J. Health Res. **34**(6), 1–17 (2020)
2. Ajmad, A., et al.: Event-driven process chain (EPC) for modeling and verification of business requirements – a systematic literature review. IEEE Access **6**, 9027–9048 (2018)
3. ARIS Community. https://www.ariscommunity.com/event-driven-process-chain. Accessed 15 Nov 2020
4. Bitkowska, A.: Zarządzanie procesowe we współczesnych organizacjach. Difin, Warsaw (2013)
5. Business Process as a Service: the features of a good app. Heflo blog. https://www.heflo.com/blog/bpm/business-process-as-a-service/. Accessed 10 Nov 2020
6. Chomiak-Orsa, I., Kołtonowska, A.: Modelowanie procesów biznesowych z wykorzystaniem sieci Petriego i BPMN. Próba oceny metod. Informatyka Ekonomiczna **2**(48), 9–18 (2018)
7. Dennis, A., Wixom, B.H., Tegarden, D.: System Analysis & Design with UML Version 2.0. An Object-Oriented Approach, 4th edn., p. 253. Wiley, Hoboken (2012)
8. Drejewicz, Sz.: Zrozumieć BPMN. Modelowanie procesów biznesowych, Helion, Gliwice (2012)
9. Gawin, B.: Modelowanie procesów biznesowych. In: Wrycza, S., Maślankowski, J. (eds.) Informatyka Ekonomiczna. Teoria i zastosowania. Polish Scientific Publishers, Warsaw (2019)
10. Gawin, B., Marcinkowski, B.: Symulacja procesów biznesowych. Standardy BPMS i BPMN w praktyce, Helion, Gliwice (2013)
11. Gzik, T.: Procesy biznesowe w chmurze obliczeniowej, Zeszyty Naukowe Politechniki Częstochowskiej Zarządzanie No. 31 (2018)
12. Jelonek, D., Stępniak, C., Turek, T., Ziora, L.: Identification of mental barriers in the implementation of cloud computing in the SMEs in Poland. In: 2014 Federated Conference on Computer Science and Information Systems, Warsaw, pp. 1251–1258 (2014)
13. Jelonek, D., Wysłocka, E.: Barriers to the development of cloud computing adoption and usage in SMEs in Poland. Adv. Inf. Sci. Appl. **1**, 128–133 (2014)
14. Jurek, J.: Wdrożenia informatycznych systemów zarządzania. Polish Scientific Publishers, Warsaw (2016)
15. Ko, R.K.L.: A computer scientist's introductory guide to business process management (BPM). Crossroads **15**(4), 11–18 (2009)
16. Mell, P., Grance, T.: The NIST definition of cloud computing, recommendations of the National Institute of Standards and Technology, NIST Special Publication 800-145 (2011). https://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf. Accessed 30 Nov 2020
17. Morawiec, P., Sołtysik-Piorunkiewicz, A.: The new role of cloud technologies in management information systems implementation methodology. In: Arai, K., Kapoor, S., Bhatia, R. (eds.) FTC 2020. AISC, vol. 1290, pp. 423–441. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-63092-8_29

18. OMG BPMN v2.0.1 Specification. https://www.omg.org/spec/BPMN/2.0.1/PDF. Accessed 13 Nov 2020
19. Pasamonik, P.: Modelowanie procesów biznesowych zorientowane na czynności. Zesz. Nauk. WSInf **9**(2), 102–116 (2010)
20. Peterson, J.L.: Petri Net Theory and the Modeling of Systems. Prentice Hall, Englewood Cliffs (1981)
21. Rosinosky, G., Labba, C., Ferme, V., Youcef, S., Charoy, F., Pautasso, C.: Evaluating multi-tenant live migrations effects on performance. In: Panetto, H., Debruyne, C., Proper, H.A., Ardagna, C.A., Roman, D., Meersman, R. (eds.) OTM 2018. LNCS, vol. 11229, pp. 61–77. Springer, Cham (2018). https://doi.org/10.1007/978-3-030-02610-3_4
22. Rosinosky, G., Youcef, S., Charoy, F.: An efficient approach for multitenant elastic business processes management in cloud computing environment. In: IEEE, pp. 311–318, June 2016
23. Rosinosky, G., Youcef, S., Charoy, F.: A genetic algorithm for cost-aware business processes execution in the cloud. In: Pahl, C., Vukovic, M., Yin, J., Yu, Qi. (eds.) ICSOC 2018. LNCS, vol. 11236, pp. 198–212. Springer, Cham (2018). https://doi.org/10.1007/978-3-030-03596-9_13
24. Schulte, S., Janiesch, Ch., Venugopal, S., Weber, I., Hoenisch, P.: Elastic business process management: state of the art and open challenges for BPM in the cloud. Future Gen. Comput. Syst. 46, 36–50 (2015)
25. Sommerville, I.: Software Engineering, 9th edn., pp. 135–136. Addison-Wesley, Boston (2010)