A Bibliometric Analysis on E-Participation

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Abstract
E-participation is one of the core issues within the E-Government domain which has emerged in the last few years. However, there are concerns regarding fragmentation of E-participation towards certain disciplines. This study aimed to find out the historical reviews, the trend of the research and identify key areas and key players in E-participation research. This study conducted a bibliometric analysis on 1122 works related to E-participation. The data was retrieved in August 2021 from a Scopus database. The evolution of E-participation was analysed by examining the number of publications, source titles, types of sources and documents and the language of the published documents. Further, the analysis of the key areas of E-participation research focused on the subject areas, most used keywords, and the title analysis. The final objective was analysed by looking into the most contributed countries in the E-participation research, the authorship and citation analysis, as well as the main institutions involved in the E-participation field of study. The study employed VOSviewer and Harzing Publish or Perish software in visualising and integrating the data, respectively. The study also analysed data using Microsoft Excel and SPSS 25.0. Findings showed that research on E-participation was started as early as 1984. The early development was very slow which caught only the attention of scholars from the West. The number of publications started to evolve in the year 2003. However, the research on this field is still inconclusive. The findings should assist future directions E-participant research and facilitate the collaboration strategies between institutions and authors.
Keywords: E-participation, Bibliometric Analysis, Harzing's Publish or Perish Software, SCOPUS, VOSviewer.

Introduction
E-participation is a process to encourage and support participation among stakeholders through technology. One of the challenges of conducting E-participation research is to robustly capture the rich context interaction between people and government (Yusuf et al, 2021). A related challenge is to understand the role of technologies in people-government interaction. E-participation aims at encouraging public participation through technology to ensure that the government's decisions are more legitimate and publicly supported (Macintosh, 2004).

In addition, E-participation is significant for educating people about the complex process of policy-making to enhance people's understanding and awareness about the rationale of the produced policy. Its implementation is not only a matter of technological ability or the participation process itself; instead, it is a combination of a complex factor that affects the participation process. Most of the previous frameworks only capture a specific domain without realising that it is connected to other factors (Yusuf et al., 2020).

Even though preceding studies have emphasised understanding E-participation from various perspectives, however, little has been done to find out the development of E-participation from the perspectives of countries or authors. This question is important since E-participation is viewed as the key tool in supporting participation among stakeholders through technology, globally.

Therefore, this paper focuses on the historical reviews, the trend of the research and key areas as well as key players in E-participation research. The bibliometric analysis in this study would look into the number of published studies per year; sources and document types; and languages of documents, subject area, countries with most contributions, keyword analysis, and citation analysis.

The next section presents the research methods, followed by results from the bibliometric analysis and their interpretations and discussion. The final section concludes the findings, states the limitations and recommends future research related to E-participation.

Methods
This study carried out a bibliometric analysis approach to analyse publications with the word 'E-participation' in their title. According to Ellegaard and Wallin (2015), a bibliometric analysis approach is one of the most extensively used techniques to assess the quality, credibility, and impact of the work. This could be used as a tool to identify potential under-researched areas in a discipline (Wallin, 2005).

Remarkably, the data was collected as of 23rd July 2020 from the Scopus database considering Scopus as one of the main sources of relevant information which is recognised internationally. The Scopus database is "the largest searchable citation and abstract source of searching literature" (Ahmi et al., 2019, p.1). Furthermore, following the objectives of this study, the analytical results were taken from all types of documents published in the database from the first publication on the topic until the year 2021.

Intrinsically, this study conducted the following query: (TITLE ("E-participation" OR "EParticipation" OR "online participation" OR "electronic participation"). A total of 1503 documents were retrieved from the search. However, after the data cleaning process, the relevant documents were reduced to 1122. Specifically, this paper looks into sources and document types, the number of published studies per year, languages of documents, subject area, title analysis, frequency of keywords, countries with most contributions, citation analysis, and authorship analysis.

This study analysed the results in several ways to provide input in response to the research objectives. Some analyses were taken directly from the Scopus database through the "analyze search results" function. Several results were exported to an Excel file and were analysed using Microsoft Excel and SPSS 25.0. In addition, the study also analysed using the 'Harzing's Publish or Perish software' and 'VOSviewer' in incorporating data and generating images, respectively. The following section presents the results of bibliometric analysis for this study.

Results

This section presents results of bibliometric analysis, i.e. "number of publications per year, document types, source types, annual growth, languages, subject areas, countries' productivity, keywords, authorships, and citations".

Number of Published Studies Per Year

Figure 1 depicts the graph on publications of E-participation's research from the year 1984 to 2021. Even though the publication in E-participation was published as early as 1984, the number of publications was stagnant. The figure shows no publications after 1984 until the year 1996. However, the trend kept fluctuating until the year 2002. The graph shows an increasing trend in the numbers of publications after the year 2002. The number gradually increased from the year 2003 until the recent year, reflecting the growing interest in E-participation. Pertinently, the number of documents for 2021 is quite low considering this study was conducted in July 2021.

Figure 1: Number of Document Per Year
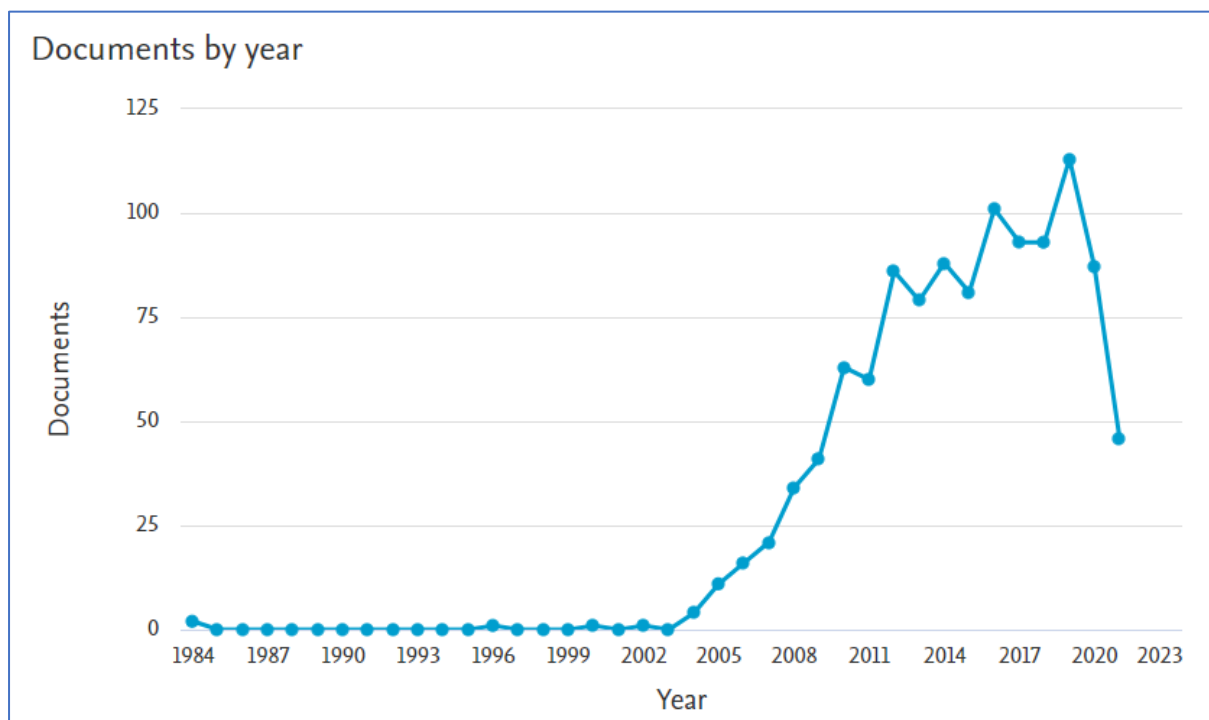
Document and Source Type

The Scopus database showed that there are ten different types of documents related to the study. The most favourite document type was conference papers (59%), as shown in Figure 2. Ahmi et al. (2019) stated that 'conference papers in the document type' refer to papers presented in conferences and were probably published as full journal articles. The next

highest document types were articles (35.3%), followed by book chapters (4.5%) and reviews (1.1%). The remaining type of documents was in form of Editorial, conference review, note and short survey.
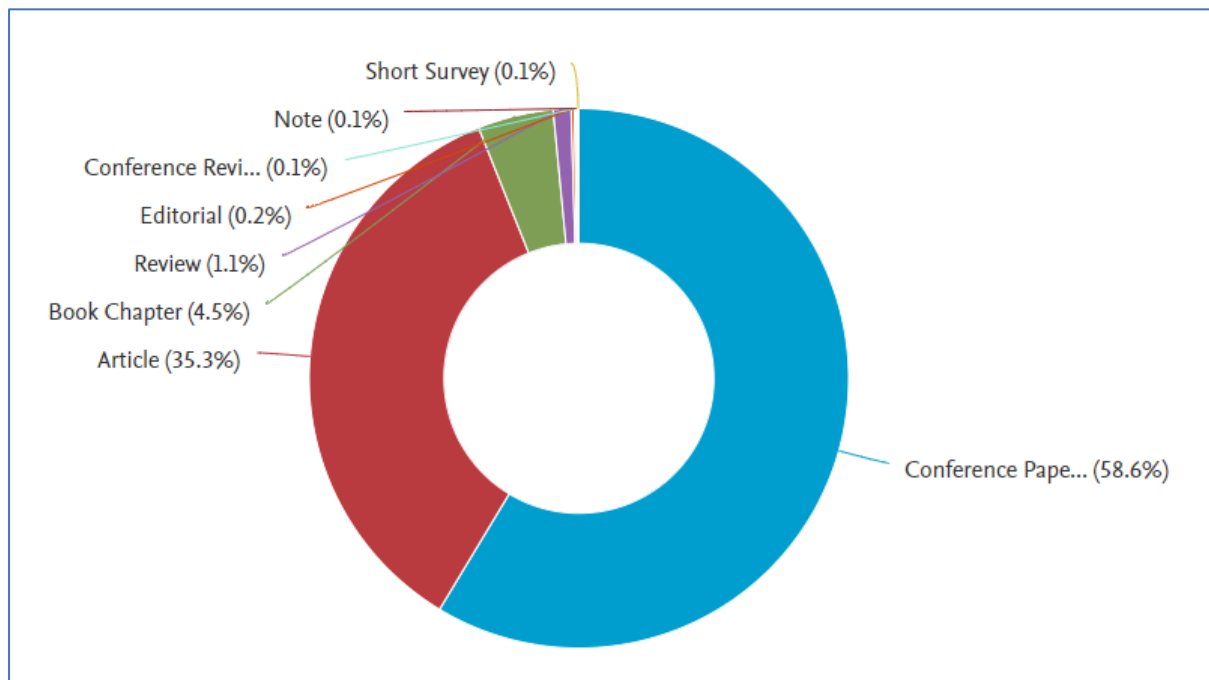

Figure 2: Document type

Further, looking into the source type related to E-participation, Table 1 indicates that, there are five types of sources, where conference proceeding represents two-fifth of the total source type. The second highest source type in E-participation's research is in journals (36.27%), followed by book series (20.32%). The number of publications in books or trade journals represents an insignificant percentage with a total of less than 5%.

Table 1: Source Type

Source type	Frequency	Percentage
Conference proceeding	455	40.55
Journal	407	36.27
Book series	228	20.32
Book	30	2.68
Trade journal	2	0.18

In addition, the following Table 2 presents **15 Most Productive Journal in the Area** of E-participation. The analysis discovered that the "Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics" published the most documents which almost 13% related to e-participation. This journal has been listed in the Scopus database since 1973 and it might be the contributing factor of the highest percentage as compared to other listed sources. The second-highest percentage for published documents on e-participation by the source was in the "ACM international conference proceeding series". This journal contributed up to 12.74% with a total of 143 documents, despite only being in circulation since 1996. The rest journals published less than

100 documents, with the lowest in the list published 10 articles up to the date of the data search.

Table 2: 15 Most Productive Journal in the Area

Source Title	no. of Document
"Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics"	146
"ACM International Conference Proceeding Series"	143
"Proceedings of The European Conference on E Government Eceg"	52
"Communications in Computer and Information Science"	36
"Government Information Quarterly"	33
"Ejournal Of Edemocracy And Open Government"	26
"International Journal of Electronic Governance"	25
"Transforming Government People Process and Policy"	19
"Proceedings of The Annual Hawaii International Conference on System Sciences"	17
"International Journal of Electronic Government Research"	14
"Ceur Workshop Proceedings"	11
"Electronic Government"	11
"Journal of Information Technology and Politics"	11
"Public Administration and Information Technology"	11
"Information Polity"	10

Languages of Documents

In terms of languages of the document, Table 3 shows that the documents related to e-participation were published in 10 languages. Most of the documents were published in English, which constitutes about 97%, and the remaining 3% were published in Portuguese, Spanish, Russian, Chinese, French, Czech, German, Japanese, and Lithuanian. Correspondingly, the most unpopular languages used in this study were Czech, German, Japanese, and Lithuanian, which each represented only 1% of the total number of documents.

Table 3: Languages of Documents

Languages of documents	Frequency
English	1092
Portuguese	13
Spanish	7
Russian	6
Chinese	4
French	2
Czech	1
German	1
Japanese	1
Lithuanian	1

Subject Area

This part presents the subject areas for published documents that have been analysed. Most of the studies on E-participation were in the computer science area, which represented more than two-fifth of the total documents. It is followed by social sciences (20.3%) and mathematics (10.7%). Alternatively, few studies related to E-participant were conducted in the areas of medicine, economics, econometrics and finance, environmental science, and arts and humanities.
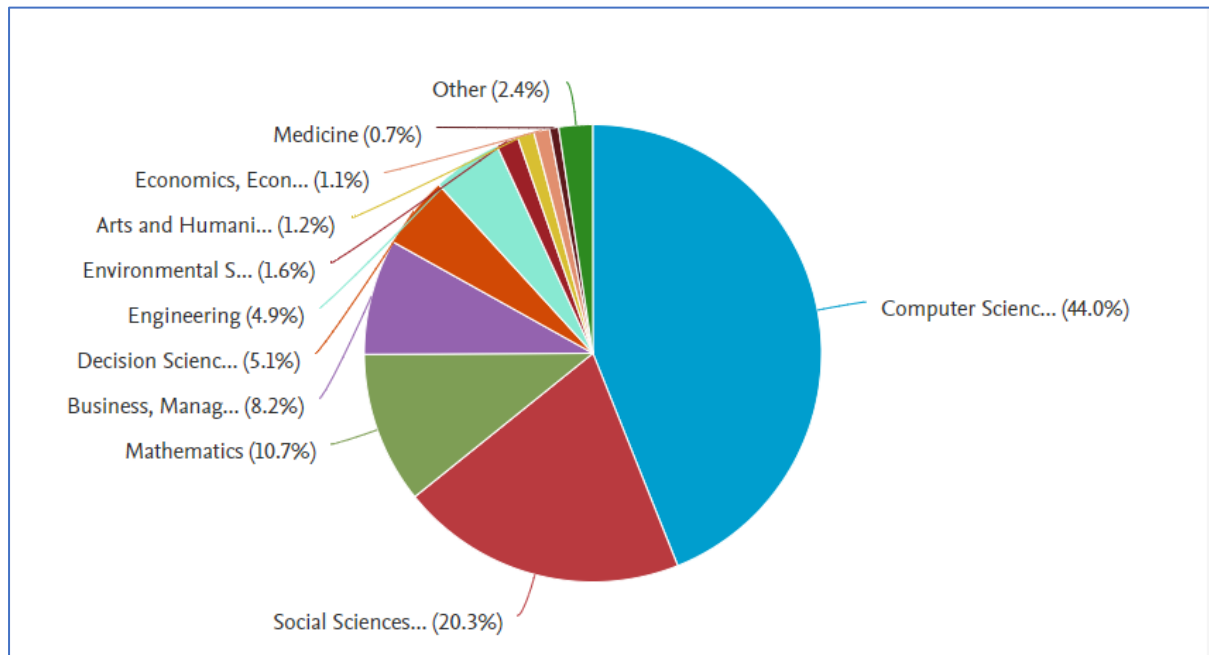
Figure 3: Documents by subject area

Geographical Distribution

Looking into geographical distributions, the data from the VOSviewer software showed that, 28 countries contributed to the research in E-participation. Table 4 lists the geographical distributions per document and the total number of citations per country for the top 15 countries. The United States ranked No.1 in publications on the e-participation and the number of citations, with a total of 105 and 1825 for the number of documents and citations, respectively. It was observed that Germany ranked second (100 documents), followed by United Kingdom (99 documents) and Spain (92 documents). Regarding the total number of citations, the United States was found to be followed by Spain and the U.K, with a total of 1512 and 1465 citations, respectively. The least publications (ranked 15th) per country was India with a total number of 26 documents and 26 citations.

Table 4: Top 15 Countries Contributed to the Publication

Rank	Country	No. of documents	Citation
1	United States	**105**	**1825**
2	Germany	100	705
3	United Kingdom	**99**	**1465**
4	Spain	**92**	**1512**
5	Italy	70	457
6	Russian Federation	69	164
7	Greece	64	652
8	Austria	59	278
9	Portugal	51	316
10	Brazil	43	130
11	Sweden	42	347
12	Ireland	40	248
13	Norway	37	465
14	Indonesia	36	88
15	china	30	140
15.	India	26	226

Keywords Analysis

The VOSviewer software was used to map the author's keywords in this study. The study constructed and visualised the bibliometric network using the software. The software visualises the authors' keywords. The association of a keyword with the other keywords was visualised through font size, colour, or the thickness of connecting lines. Figure 4 portrays the keyword map of the author's keywords. For example, e-participation, e-government, e-democracy, e-governance, digital governance featured a similar colour, suggesting that these keywords exhibited a close relationship that co-occurred together.
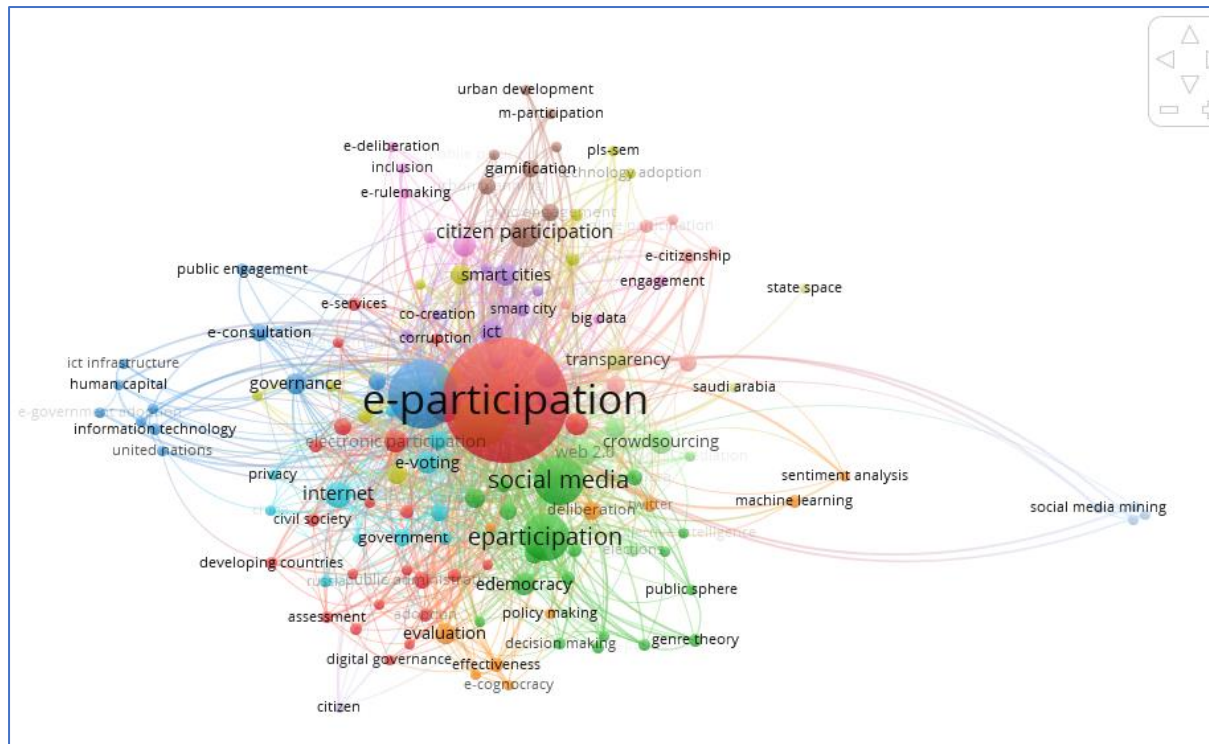
Figure 4: Keyword map for the study on E-participation

In addition, this study used the VOSviewwer to determine the minimum number of occurrences of a keyword. The threshold for the minimum occurrence of the keyword was set at five. In the end, only 135 out of 2366 keywords met the threshold. The result also identified that the keyword "e-participation" was the most used keyword in this area of study. It covers almost two-thirds of the number of documents (62.66%). The primary ten (10) keywords used in E-participation research are shown in Table 5.

Table 5: Ten (10) Most Used Keywords

Rank	Keywords	No. of Documents
1	e-participation	703
2	e-government	211
3	e-democracy	128
4	Social media	113
5	Eparticipation	106
6	e-governance	47
7	Public participation	38
8	Citizen participation	38
9	Open government	30
10	Web 2.0	27

Citation Analysis

This study used "Harzing's Publish or Perish software" to search for the citation metrics. The data gathered from Scopus database was imported into the software to generate citation metrics on 23rd July 2021. Table 6 illustrates the summary of the citation metrics. It shows that the documents related to E-participation were published since 1984 and the topic studied were cited in the past 37 years. There are a total of 1122 papers that were published with a total citation of 9373. The documents were cited on average 253.32 per year and the citations per paper were 8.35. The metric table also indicates information on authors per paper and the indexes.

Table 6: Citation Metrics

Publication years	1984-2021
Citation years	37 (1984-2021)
Papers	1122
Citations	9373
Cites/year	253.32
Cites/paper	8.35
Authors/paper	2.65
Hirsch h-index	42
Egghe g-index	68
PoP hl,norm	26
Pop hl, annual	0.70

Table 7 shows the top ten (10) list of authors who have contributed to the field of E-participation studies. The list shows that Porwol L is the most productive author with 22 papers on E-participation research. Wimmer, M. A has made the second-highest contribution by publishing 20 published documents on E-participation. The remaining eight authors published 10 and more papers on the e-participations. It is significant to mention that, the number of documents per author did not reflect the number of citations for that particular author. Table 8 shows details on the highest number of citations for the author.

Table 7: Top Ten (10) Authors in E-participation Study

Author	No. of Documents	Citations
Porwol, L.	22	97
Wimmer, M.A.	20	188
Ojo, A.	19	92
Charalabidis, Y.	19	266
Loukis, E.	18	217
Vidiasova, L.	16	31
Thiel, S.K.	16	109
Parycek, P.	12	70
Scherer, S.	11	112
Breslin, J.	10	33

Table 8 depicts 20 most cited articles (based on the number of times being cited). In addition to total citations reported by Scopus, the table also discloses the total number of citations reported by Google Scholar. The document entitled "Local e-government 2.0: Social media and corporate transparency in municipalities" by Government Information Quarterly that was published in 2012 has received the highest number of citations (524 citations or an average of 58.22 citations per year). Remarkably, the same article obtained the highest number of citations according to the calculation of Google Scholar as of 23rd July 2021. It had been cited 1115 citations with an average citation per year of 123.89. Despite receiving the highest number of citations, it is worth mentioning that Royo just published six (6) papers only. In addition, the table shows that the papers were published in widely ranged sources which indicates the interdisciplinary nature of these E-application studies.

Table 8: Top 20 Cited Articles in E-participation Study

Authors	Source	Title	Year	Cites	Cites per Year	GS Cites	GS Cites per Year
Bonsón, E., Torres, L., Royo, S., & Flores, F.	Government Information Quarterly	"Local e-government 2.0: Social media and corporate transparency in municipalities"	2012	524	58.22	1115	123.8889
Macintosh, A.	Proceeding of the Hawaii International Conference on System Sciences	"Characterizing e-participation in policy-making"	2004	305	17.94	1045	61.47059
Bonsón, E., Royo, S., & Ratkai, M.	Government Information Quarterly	"Citizens' engagement on local governments' Facebook sites. an empirical analysis: The impact of different media and content types in western Europe"	2015	223	37.17	410	68.33333
LeBlanc, A. G., Chaput, J. P., McFarlane, A., Colley, R. C., Thivel, D., Biddle, S. J., ... & Tremblay, M. S.	PloS ONE	"Active Video Games and Health Indicators in Children and Youth: A Systematic Review"	2013	167	20.88	294	36.75
Dringus, L. P., & Ellis, T.	Computers and Education	"Using data mining as a strategy for assessing asynchronous discussion forums"	2005	156	9.75	328	20.5
Shim, D. C., & Eom, T. H.	International Journal of Public Administration	"E-Government and anti-corruption: Empirical analysis of international data"	2008	148	11.38	365	28.07692
Robertson, S. P., Vatrapu, R. K., & Medina, R.	Information Polity	"Off the wall political discourse: Facebook use in the 2008 U.S. presidential election"	2010	113	10.27	258	23.45455

Conroy, M. M., & Evans-Cowley, J.	Environment and Planning C: Government and Policy	"E-participation in planning: An analysis of cities adopting on-line citizen participation tools"	2006	104	6.93	186	12.4
Macintosh, A., Coleman, S., & Schneeberger, A.	1st International Conference on Electronic Participation, ePart 2009	"eParticipation: The research gaps"	2009	92	7.67	193	16.08333
Vicente, M. R., & Novo, A.	Government Information Quarterly	"An empirical analysis of e-participation. The role of social networks and e-government over citizens' online engagement"	2014	91	13	202	28.85714
Shim, D. C., & Eom, T. H.	International Review of Administrative Sciences	"Anticorruption effects of information communication and technology (ICT) and social capital"	2009	90	7.5	195	16.25
Reddick, C. G.	Transforming Government: People, Process and Policy	"Citizen interaction and e-government: Evidence for the managerial, consultative, and participatory models"	2011	87	8.7	135	13.5
Åström, J., Karlsson, M., Linde, J., & Pirannejad, A.	Government Information Quarterly	"Understanding the rise of e-participation in non-democracies: Domestic and international factors"	2012	86	9.56	177	19.66667
Grover, P., Kar, A. K., Dwivedi, Y. K., & Janssen, M.	Technological Forecasting and Social Change	"Polarization and acculturation in US Election 2016 outcomes â€" Can twitter analytics predict changes in voting preferences"	2019	83	41.5	118	59
Sæbø, Ø., Flak, L. S., & Sein, M. K.	Government Information Quarterly	"Understanding the dynamics in e-Participation initiatives: Looking through the genre and stakeholder lenses"	2011	77	7.7	143	14.3

Guillamón, M. D., Ríos, A. M., Gesuele, B., & Metallo, C.	Government Information Quarterly	"Factors influencing social media use in local governments: The case of Italy and Spain"	2016	70	14	139	27.8
Elvira, N. I. C. A., Popescu, G. H., Nicolăescu, E., & Constantin, V. D.	Transylvanian Review of Administrative Sciences	"The effectiveness of social media implementation at local government levels"	2014	68	9.71	114	16.28571
Lev-On, A., & Steinfeld, N.	Government Information Quarterly	"Local engagement online: Municipal Facebook pages as hubs of interaction"	2015	66	11	124	20.66667
Charalabidis, Y., Loukis, E. N., Androutsopoulou, A., Karkaletsis, V., & Triantafillou, A.	Transforming Government: People, Process and Policy	"Passive crowdsourcing in government using social media"	2014	64	9.14	107	15.28571
Rose, R.	Journal of Public Policy	"A global diffusion model of e-governance"	2005	61	3.81	109	6.8125

Conclusions

A bibliometric review approach had been employed in this study. The main objective is to get a clearer understanding on historical reviews, development trend, and forecast on the E-participation literature. The research on this topic began in 1984 but started to evolve from the year 2003. Several authors wrote articles related to E-participation with a mean collaboration index of 2.65 authors per article. The bibliometric analysis in this study discovered different themes that constituted the research area of E-participation, which was mostly related to e-government, e-democracy, e-governance, digital governance and social media. Research on e-participation was mostly conducted in western countries. It proposes that research on this topic should be widely introduced and conducted in developing countries considering the importance of E-participation in various aspects. Besides, this study identified several limitations related to the use of the database. Despite the Scopus database being one of the largest databases, there are still a lot of unindexed journals studied on this topic. Future research may focus on a meta-analysis or a systematic review of literature on the E-participation related topics. Future studies may focus on a comprehensive content analysis of articles in the research domain. Essentially, studies on E-participation is worth to be explored, taking into account the increasing interest in recent literature. The study of E-participation is also significant attributable to the need of current working environment as majority of organisations are moving towards working virtually. This study can be a benchmark to draw the attention of future researchers who are expected to contribute to the growing scientific work on E-participation.

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