INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 15, Issue 4, (2025) E-ISSN: 2222-6990

Comprehensive Bibliometric Mapping of Publication Trends in the e-Government: A Bibliometrix Analysis

Fauzan

Faculty of Technology Management and Technopreneurship, Centre of Technopreneurship Development, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya 76100, Durian Tunggal, Melaka Fakultas Ekonomika dan Bisnis, Universitas PGRI Kanjuruhan Malang, Malang, Indonesia

Mohd Amin Mohamad

Faculty of Technology Management and Technopreneurship, Centre of Technopreneurship Development, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya 76100, Durian Tunggal, Melaka

Corresponding Author Email: amin@utem.edu.my

To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v15-i4/25124 DOI:10.6007/IJARBSS/v15-i4/25124

Published Date: 06 April 2025

Abstract

Purpose: E-government is defined as the transformation of government processes and structures through the use of information and communication technology to create better governance, including improving the quality of public services, community participation, and government accountability. This study aims to examine aspects of scientific literature including publications, authors, journals, and citation patterns to gain a better understanding and to map trends in e-Government research. **Design/methodology/approach:** Bibliometrix analysis was conducted to gain insight into e-Government using the Scopus database published from 2002-2024. A total of 539 articles were analyzed using the help of VOSviewer, Publish or Perish, biblioMagika, and Biblioshiny software. **Findings:** Over the 22-year period of publication, there has been a consistent increase in the number of publications, especially from 2009 to 2012. This can be attributed to the increasing number of researches in the fields of computer science, social sciences, and business, management, and accounting. The largest source in terms of publications is the International Journal of Electronic Government Research. **Research limitations/implications:** The Scopus database was used to select articles analyzed, excluding articles from other databases. In addition, this bibliometric analysis only focuses on published scientific literature, which may not cover all forms of research results. **Practical implications:** This research provides valuable insights for policy makers and governments to create better, more effective, and more efficient governance. And helps researchers focus on exploring topics that have not been studied thoroughly.

Originality/value: The novelty in this article is about e-Government and TAM, which in previous articles were not detailed, but only presented in general. This study shows the relevance in the field of e-Government in recent years, and continues to be explored as an interesting phenomenon in the field of good governance.
Keyword: E-Government, Bibliometrix, Bibliometric Analysis

Introduction

The revolution in government, organizations and individuals to carry out their duties began with the emergence of the World Wide Web (www). International organizations provide advice and motivation to the government to utilize information technology, which is currently known as e-Government. So that in recent years there has been development and improvement of government work that leads to increased integrity, transparency, and all principles of good governance by utilizing information technology (Janita & Miranda, 2018). E-Government is a service provided by the government to stakeholders that can be accessed electronically. Therefore, e-Government is defined as a service provided by a government entity by utilizing information and communication technology.

Over the past 20 years, governments around the world have adopted technology and information systems, to provide services, delivery, and management to the public (Avotra et al., 2021). E-Government helps governments to better manage public issues and support innovation and creativity, so that government work is more responsive, modern, efficient, and effective for stakeholders. That way, citizen services, internal management, regulatory activities can be carried out properly (Nulhusna et al., 2017).

There are several factors that are the key to the success of e-Government development, namely: information technology, public trust, infrastructure, legislative will, human resource management (Cortés-Cediel et al., 2023; Hashim, 2024; Hochstetter et al., 2023; Weigl et al., 2024; Yeh, 2017). There are 2 points of view that can provide benefits to public service activities. First, the community's point of view, namely: (a) citizens are facilitated to supervise the government in decision making. (b) increasing citizen awareness of their rights and obligations. Second, the government's point of view, namely: (a) increasing transparency and integrity of government institutions. (b) reducing corrupt behavior (Avotra et al., 2021).

The rapid advancement of information and communication technology has an important role in regulating public administration. The implementation of e-Government in government activities has increased the attention of many researchers to study it. Studies on e-Government are increasing and the number of publications is also increasing (Napitupulu & Yakub, 2021).

This study fills the gap in e-Government literature by providing a new perspective on bibliometric analysis. Most previous studies have focused on bibliometric analysis using VOSviewer and Publish of Perish analysis tools (Ajibade & Mutula, 2019; Alcaide–Muñoz et al., 2017; Dias, 2014, 2019; Jiang et al., 2022; Joseph, 2013; Milićević et al., 2023; Song et al., 2024), and systematic review (Sánchez-Torres & Miles, 2017; Stefanovic et al., 2021; Weigl et al., 2024), but few have explored using other analysis tools such as biblioshiny. Therefore, this study contributes by examining e-government with a bibliometric approach using the

biblioshiny analysis tool to better understand the trend and development of the study topic on e-government.

In addition, this study also addresses the gap in the literature related to the lack of empirical data from developing countries, the lack of user perspectives in e-Government evaluation, or the imbalance between theoretical and practical approaches. By using a bibliometric analysis approach, this study provides new insights that have not been widely discussed in previous studies.

The purpose of this study is to provide scientific information on e-Government through bibliometric analysis (Fauzan et al., 2022; Fauzan & Jahja, 2021). Bibliometric analysis is a generally accepted statistical tool, helping to describe the mechanism of knowledge and growth trends in a particular field of study (Han et al., 2020; Hicks et al., 2015). There are two objectives in this study, (1) focusing on descriptive analysis, presenting the most productive and influential countries, authors, journals, organizations related to the subject being studied, namely e-Government (Zurita et al., 2020). (2) Network analysis to determine collaboration in e-Government studies.

Therefore, the current study is an attempt to conduct a bibliometric analysis of published research on e-Government. This study was conducted to answer the following research questions based on published research on e-Government: (1) What is the trend pattern of annual publications? (2) Who are the main contributing authors? (3) Which articles have the highest number of citations? (4) Which countries are the most productive? (5) Which universities are the most productive? (6) Which scientific journals are the most trending? (7) What are the most frequently used keywords of authors? (8) What is the trend pattern of collaborations and co-citations? The answers to these questions help to get a feel for the current research direction and will definitely add value to the e-Government domain.

This article is organized into five sections: The first section briefly explains the relevance of the current research. The second section summarizes the studies that reviewed e-Government and reveals the research gaps. The third section details the methodology followed in the current research. The fourth section presents the results of the bibliometric analysis in the form of tables, graphs, and networks. The fifth section presents the discussion, and the last section ends with a conclusion.

Literature Review

Government services before the e-Government system were carried out face-to-face. In other words, government staff and citizens who need services must meet and communicate directly (offline). However, with the e-Government system, people who need services from government staff do not need to meet directly, services will be provided by utilizing internet technology (online). This online service will increase management efficiency, reduce costs, save time, and increase synergy between departments (Fan & Yang, 2015). In addition, the use of information and communication technology in government service activities can build an efficient and transparent government system (Nulhusna et al., 2017).

Definition of e-Government

The term e-Government has various definitions, but most conceptualizations of e-Government focus on the role of information and communication technology in facilitating government-to-government (G2G), government-to-business (G2B), and government-to-citizen (G2C) services, and government-to-employee (G2E) (Al-Hadidi & Rezgui, 2010; Baker El-Ebiary et al., 2020). E-Government is defined as operations related to the efforts of all government agencies to use and provide detailed and accurate information and communication technology to provide electronic services (Rakhman et al., 2019). E-Government is a service provided by the government to the public electronically to increase transparency, accountability, and participation (Sabani, 2020). While Sabani et al., (2018) defines e-Government as the process of improving relations between the government and stakeholders by utilizing information and communication technology. While the United Nations defines it as the use of information and communication technology and its applications by government entities to provide public services and provide information (Sharma et al., 2018). Then Alshammari et al., (2022) defines e-Government as a strategy and its enforcement, including the use of all types of wireless and mobile technologies, devices, services, and applications to optimize benefits for stakeholders including citizens, government units, and businesses.

e-Government Success Factors

The success of e-Government implementation carried out by government agencies in the use of information and communication technology is influenced by the following factors: institutions, leadership, resources, intra and inter-organizations, and the availability of organizational infrastructure facilities. Meanwhile, policies, planning, institutions, and applications are factors that hinder the realization of e-Government. Therefore, to improve the quality of public services must be supported by the ability of human resources, facilities and infrastructure of information and communication technology (Yusriadi et al., 2017).

Methode

Identification of Articles

Methodology needs to be constructed to conduct research. To identify relevant articles, the method used in this study follows Figure 1. A systematic literature review begins by defining the main objective and scope of the study to be conducted. After the objectives are obtained, this study determines a combination of keywords to formulate a search code. This search code will simplify the process of identifying articles to be counted in the analysis. The source from which the articles are identified is also important, therefore it is necessary to determine relevant and reliable sources for literature searches. In general, the databases used to identify articles are WoS and Scopus (Denney & Tewksbury, 2013). However, this study only uses the Scopus database. Then, an initial search is carried out and will produce a collection of articles. The next step is filtering the search results for articles. This filtering is done to eliminate articles that are not relevant to the study being conducted. The result of the filtering is a final list of articles to be identified and analyzed as a basis for the research structure.

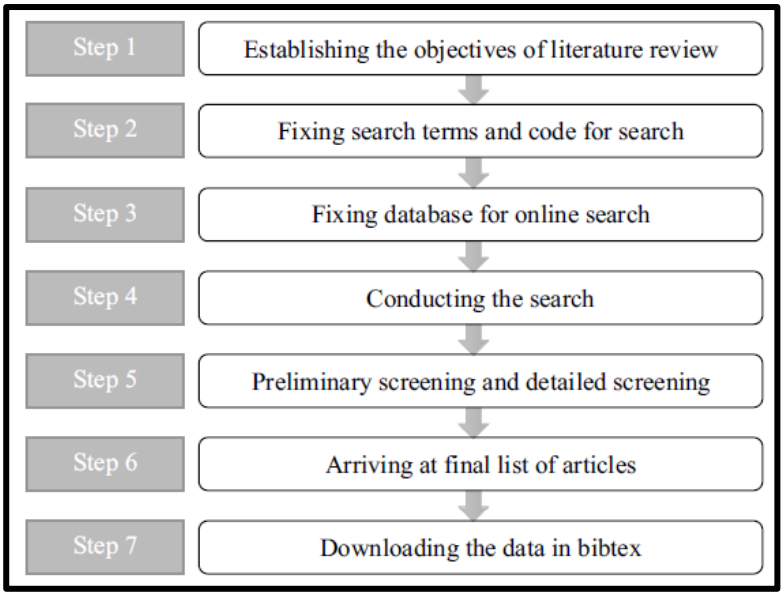

Figure 1: Methodology for identification of articles
Source: (Lazar & Chithra, 2020)

In this research, an attempt was made to explore areas of knowledge regarding e-Government that are documented in published literature. Quick search on Scopus database. Therefore, bibliometric analysis of published research on e-Government is the main motive of this research. Based on the study objectives, the keywords determined are those that appear in the article title:
e-Government
Technology Acceptance Model

Next, the search code is set, as shown below:
TITLE-ABS-KEY(egovernment OR Egovernment OR eGovernment OR EGovernment OR e-Government OR E-Government OR e-government OR E-government) AND TITLE-ABS-KEY(the technology acceptance model))

A comprehensive search was conducted in the online database Scopus (https://www.scopus.com). The search was limited to literature published up to 2024. A summary of the search results in Scopus is illustrated in Figure 2. The initial search in Scopus yielded 539 articles. In the initial screening, there were no exceptions, either in terms of type, source, and language of the document. In this study, to arrive at relevant papers, the following limitations were set.

1. Articles discussing e-Government using the TRA method
2. Articles proposing main criteria, frameworks, ranking systems, index systems, performance assessment systems for e-Government using the TRA method

Articles that meet either of the two requirements are selected. From the Scopus database, 539 articles were obtained. Thus, determining 539 articles from Scopus were selected for analysis. The final step is, downloading all potential papers in Bibtex format with ‘bib’ as an extension for bibliometric analysis using the ‘bibliometrix’ application in the R platform. Figure 2 shows the steps of literature search.

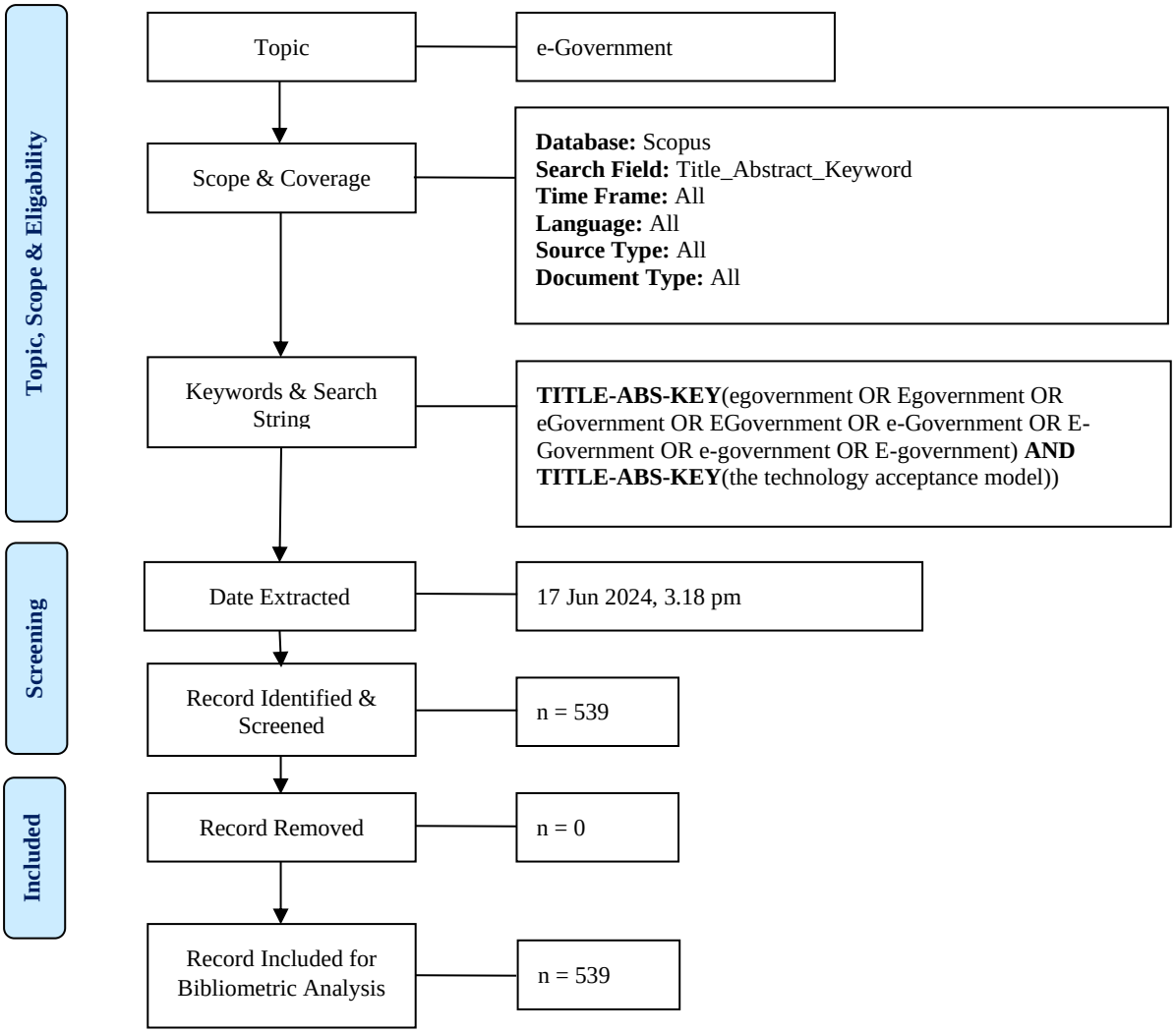

Figure 2: Flow diagram of the search strategy in the Scopus database
Source: (Zakaria et al., 2021)

Bibliometric Analysis using "Bibliometrix"

As the growth of published research continues to increase, the effort required to collect knowledge becomes more complex. Therefore, bibliometric analysis becomes a key activity while conducting a systematic literature review. "Bibliometrix" is a tool programmed in the R platform (https://www.bibliometrix.org) to perform a comprehensive bibliometric analysis of published literature. There are several packages in R that cover bibliometrics, but not all of them cover the entire workflow (Aria & Cuccurullo, 2017). The procedure for conducting a bibliometric analysis using 'bibliometrix' is shown in Figure 3.

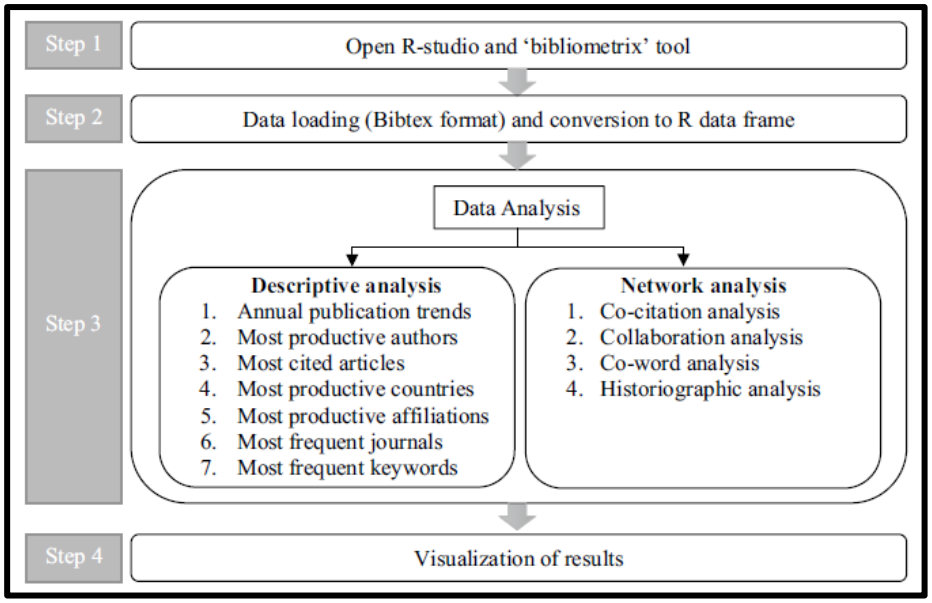

Figure 3: Methodology for bibliometric analysis
Source: (Lazar & Chithra, 2020)

Findings

Descriptives Analysis

Main information

General information regarding the collection of selected articles retrieved from the 'bliometrix' application is shown in Table 1.

Table 1
Main information regarding selected articles

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2002:2024
Sources (Journals, Books, etc)	298
Documents	539
Annual Growth Rate %	15.32
Document Average Age	8.42
Average citations per doc	30.86
References	24150
DOCUMENT TYPES	
article	287
book chapter	28
conference paper	188
conference review	26
editorial	1
note	1
retracted	1
review	7
DOCUMENT CONTENTS	
Keywords Plus (ID)	1285
Author's Keywords (DE)	1092
AUTHORS	

Authors	1132
Authors of single-authored docs	62
AUTHORS COLLABORATION	
Single-authored docs	95
Co-Authors per Doc	2.71
International co-authorships %	19.67

Source: Bibliometrix

Annual Publication Trends

Huang, Ambra, and Bhalla according to the Scopus database were the first to write a paper on e-Government using The Technology Acceptance Model in 2002. They wrote a paper entitled "An empirical investigation of the adoption of egovernment in Australian citizens: Some unexpected research findings", published in The Journal of Computer Information Systems; Stillwater, Vol. 43, Issue. 1, pages 15-22 (Huang et al., 2002). In the early years the growth of e-Government research publications showed slow growth, but in the following years experienced rapid growth. According table 2, In 2012, the publication increased to 42 documents, and became the highest annual publication. Figure 4 and 5 shows the annual publication trend until 2021. Although in 2013 there was a decline, following an exponential distribution, in general the annual publication trend increased. This increase in the publication trend indicates that researchers, practitioners and academics still have a high interest in studies on e-Government using the Technology Acceptance Model (TAM) theory.

Table 2
Annual Research Output and Citation Metrics

Year	TP	NCA	NCP	TC	C/P	C/CP	*h*	*g*	*m*
2002	1	3	1	47	47.00	47.00	1	1	0.043
2003	1	1	1	185	185.00	185.00	1	1	0.045
2004	2	4	2	235	117.50	117.50	2	2	0.095
2005	3	5	3	1775	591.67	591.67	3	3	0.150
2006	8	22	7	1010	126.25	144.29	5	8	0.263
2007	10	18	6	534	53.40	89.00	5	10	0.278
2008	17	37	16	1828	107.53	114.25	12	17	0.706
2009	36	81	26	1563	43.42	60.12	15	36	0.938
2010	26	69	21	1119	43.04	53.29	14	26	0.933
2011	36	89	27	1875	52.08	69.44	16	36	1.143
2012	42	99	30	955	22.74	31.83	14	30	1.077
2013	26	66	24	588	22.62	24.50	11	24	0.917
2014	28	71	25	320	11.43	12.80	9	17	0.818
2015	29	64	24	732	25.24	30.50	9	27	0.900
2016	26	66	24	792	30.46	33.00	12	26	1.333
2017	31	93	31	842	27.16	27.16	14	28	1.750
2018	28	74	26	560	20.00	21.54	13	23	1.857
2019	36	96	33	545	15.14	16.52	12	22	2.000
2020	35	82	31	526	15.03	16.97	14	22	2.800
2021	31	83	25	232	7.48	9.28	9	14	2.250
2022	38	126	35	345	9.08	9.86	10	17	3.333
2023	26	90	14	82	3.15	5.86	4	8	2.000
2024	23	97	10	23	1.00	2.30	3	4	3.000
Total	**539**	**1436**	**442**	**16713**	**31.01**	**37.81**	**62**	**118**	**2.696**

Note: TP=total number of publications; NCA=number of contributing authors; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index; m=m-index.
Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

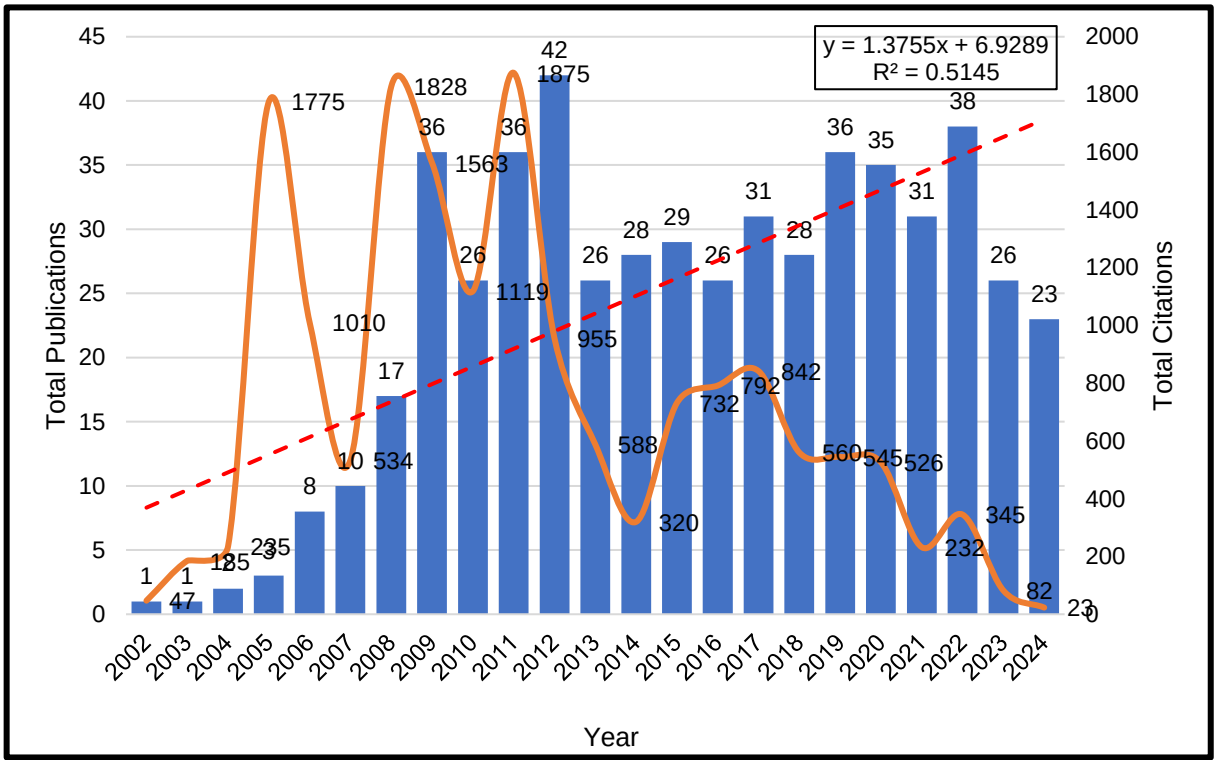

Figure 4: Total publications and total citations by year
Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

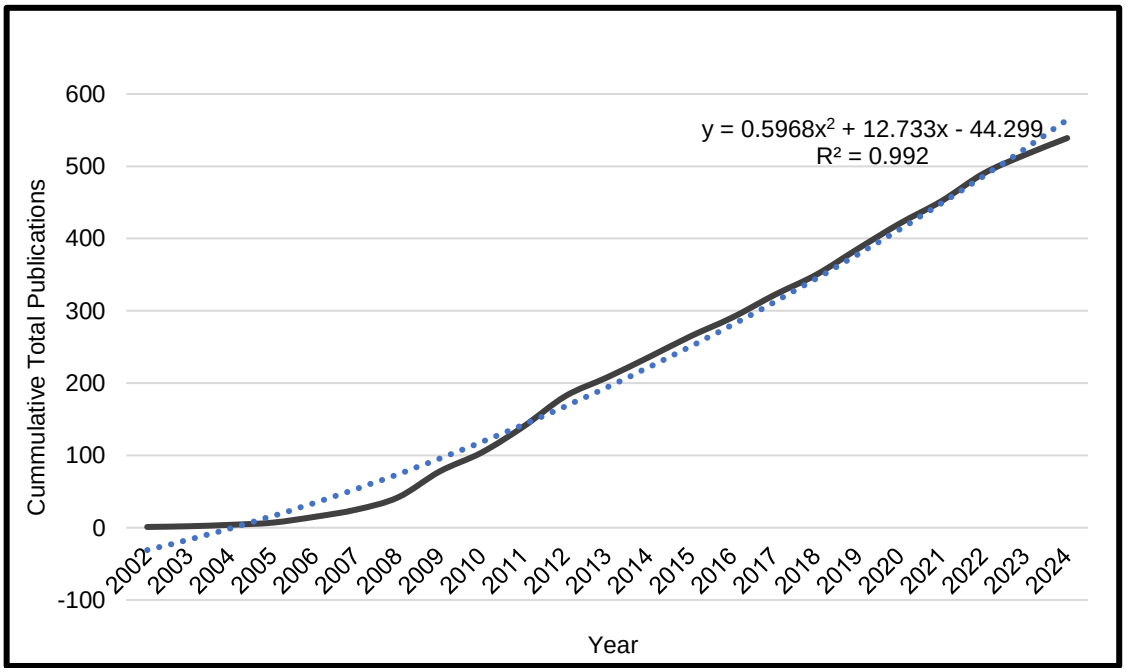

Figure 5: Cumulative growth of publications over time (1997-2023)
Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

Table 3
Details of most productive authors

Author	NP	h-index	g-index	m-index	TC	Publication Year
Na Na	25	1	1	0.063	1	2006, 2007, 2008, 2009, 2010, 2011, 2012, 2014, 2015, 2019, 2020
Weerakkody V	12	8	12	0.571	663	2008, 2009, 2010, 2014, 2016, 2019
Mensah Ik	11	5	7	1	66	2017, 2018, 2019, 2020, 2021
Carter L	10	10	10	0.556	2192	2004, 2005, 2008, 2009, 2010, 2011
Al-Shafi S	9	7	9	0.5	259	2008, 2009, 2010
Dwivedi Yk	8	6	8	0.545	275	2011, 2012, 2013, 2014, 2016
Williams Md	8	6	8	0.545	275	2011, 2012, 2013, 2014, 2016
Ramayah T	7	4	7	0.308	373	2009, 2010, 2011, 2012, 2014
Lee J	6	4	6	0.308	223	2009, 2010, 2012, 2016
Rana Np	6	4	6	0.364	256	2011, 2012, 2013, 2014, 2016

Table 4
Most cited papers (global)

Paper	Journal	Total Citations	TC per Year
Carter L, (2005)	Information System Journal	1287	75.7059
Hung Sy, (2006)	Government Information Quarterly	388	24.25
Venkatesh V, (2011)	Information System Journal	369	33.5455
Horst M, (2007)	Computer in Human Behavior	329	21.9333
Verdegem P, (2009)	Government Information Quarterly	309	23.7692
Carter L, (2008)	Information System Frontiers	301	21.5
Gupta B, (2008)	Journal of Strategic Information Systems	282	20.1429
Lean Ok, (2009)	International Journal of Information Management	271	20.8462
Alawadhi S, (2008)	Proceedings of the 41st Hawaii International Conference on System Sciences	256	18.2857
Lin F, (2011)	Government Information Quarterly	219	19.9091

Most Productive Author

There are 539 documents obtained from the Scopus database involving contributions from 1132 authors from various countries. Of the total contributing authors, 687 (81.98%) are single authors in the publication, 107 authors (12.77%) appear twice, 26 authors (3.10%) appear three authors (1.5%), the remaining 18 authors (2.15%) appear four to twenty-five authors. The 10 authors with the most contributions are shown in Table 3. Na Na, Weerakkody V, and Mensah IK are the three main authors who have contributed to the e-Government study with twenty-five, twelve, and eleven publications respectively.

Most Cited Articles

Tables 4 and 5 show the most cited articles globally and locally. Global citations are calculations made by Scopus based on the annual citation frequency calculated at the

moment when the data was downloaded. Meanwhile, local citations are measured from the citation frequency of articles selected by the collection of selected articles themselves (Aria & Cuccurullo, 2017). The first most cited article is (Carter & Bélanger, 2005), the use of e-Government services can improve the convenience and accessibility of government services and information to its citizens. While Hung et al., (2006) is the second most cited article, regarding the determinants of user acceptance of e-Government services in online tax filing and payment systems in Taiwan. The third most cited article (Venkatesh et al., 2011), in his study presents an extension of the two-stage expectation confirmation theory of information systems (IS) continuance using UTAUT. Carter (2005) is the most cited article, both globally and locally.

Table 5
Most cited papers (local)

Document	Journal	Local Citations	Global Citations	Local Citations (%)
Carter L, (2005)	Information System Journal	152	1287	11.81
Hung SY, (2006)	Government Information Quarterly	59	388	15.21
Lean OK, (2009)	International Journal of Information Management	46	271	16.97
Horst M, (2007)	Computer in Human Behavior	44	329	13.37
Lin F, (2011)	Government Information Quarterly	42	219	19.18
Carter L, (2008)	Government Information Quarterly	42	301	13.95
Alawadhi S, (2008)	Proceedings of the 41st Hawaii International Conference on System Sciences	34	256	13.28
Wang YS, (2009)	Government Information Quarterly	29	188	15.43
Gupta B, (2008)	Journal of Strategic Information Systems	28	282	9.93
Schaupp LC, (2010)	Computer in Human Behavior	27	155	17.42

Most Productive Country

The most productive countries in publishing articles are presented in table 6. The top ten countries in publishing research articles on e-Government are presented using the Technology Acceptance Model theory. Table 5 reveals that Malaysia, China and the USA occupy 29.68% of the selected articles in e-Government research. Figure 6 shows that geographical publications.

Table 6
Most productive countries

Country	Articles	% of Articles
Malaysia	54	10.02%
China	53	9.83%
United States	53	9.83%
Indonesia	49	9.09%
United Kingdom	47	8.72%
Jordan	26	4.82%
India	24	4.45%
Australia	23	4.27%
Saudi Arabia	23	4.27%
Taiwan	18	3.34%

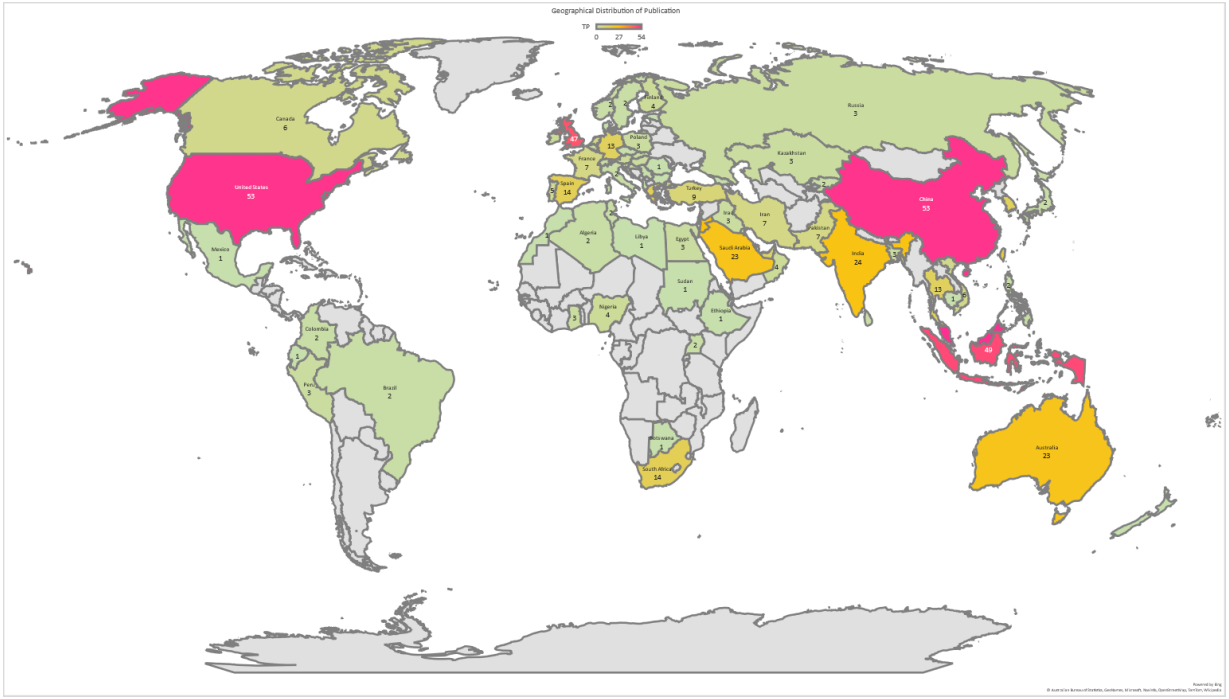

Figure 6: Country scientific production

Most Productive Affiliation

Table 7 shows the most productive institutions and the number of articles published. Brunel University is the most productive institution of the top ten countries in e-Government research covering 3.89% with 17 selected articles. ASEAN countries placed three institutions in the top ten countries, represented by Universiti Sains Malaysia, Bina Nusantara University, and Universiti Utara Malaysia.

Table 7
Most Productive Affiliation

Affiliations	Articles	% of Articles
Brunel University	17	3.89
Swansea University	9	2.06
Universiti Sains Malaysia	9	2.06
Seoul National University	8	1.83
Qatar University	7	1.60
Bina Nusantara University	6	1.37
Griffith University	6	1.37
Jiangxi University of Science and Technology	6	1.37
Universiti Utara Malaysia	6	1.37
Asian Institute of Technology	5	1.14

Table 8
Most frequent journal

Source	NP	h_index	g_index	m_index	TC	PY_start
International Journal of Electronic Government Research	21	9	15	0.6923	254	2009
Proceedings of The European Conference on E-Government, Eceg	21	6	8	0.3750	91	2006
Transforming Government: People, Process And Policy	20	14	20	1.0000	734	2008
Government Information Quarterly	18	15	18	0.7895	1857	2003
Acm International Conference Proceeding Series	17	3	4	0.2308	28	2009
Electronic Government	12	6	11	0.3529	134	2005
Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence And Lecture Notes in Bioinformatics)	11	5	8	0.3333	76	2007
International Journal of Public Administration	6	6	6	0.6667	79	2013
Journal of Theoretical and Applied Information Technology	6	2	3	0.2222	11	2013
International Journal of Business Information Systems	5	2	5	0.1667	29	2010

Note: NP=Number of Publication, TC=Total Citation, PY=Publication Year Start

Most Frequently Published Journals

298 document sources have published 539 selected articles. Table 8 presents the analysis of document sources downloaded from the Scopus database. The top ten document sources on e-Government are presented. The highest number of publications are “International Journal of Electronic Government Research” and “Proceedings of The European Conference on E-Government”, with 21 documents. Figure 7 shows the productivity of the journals from year to year.

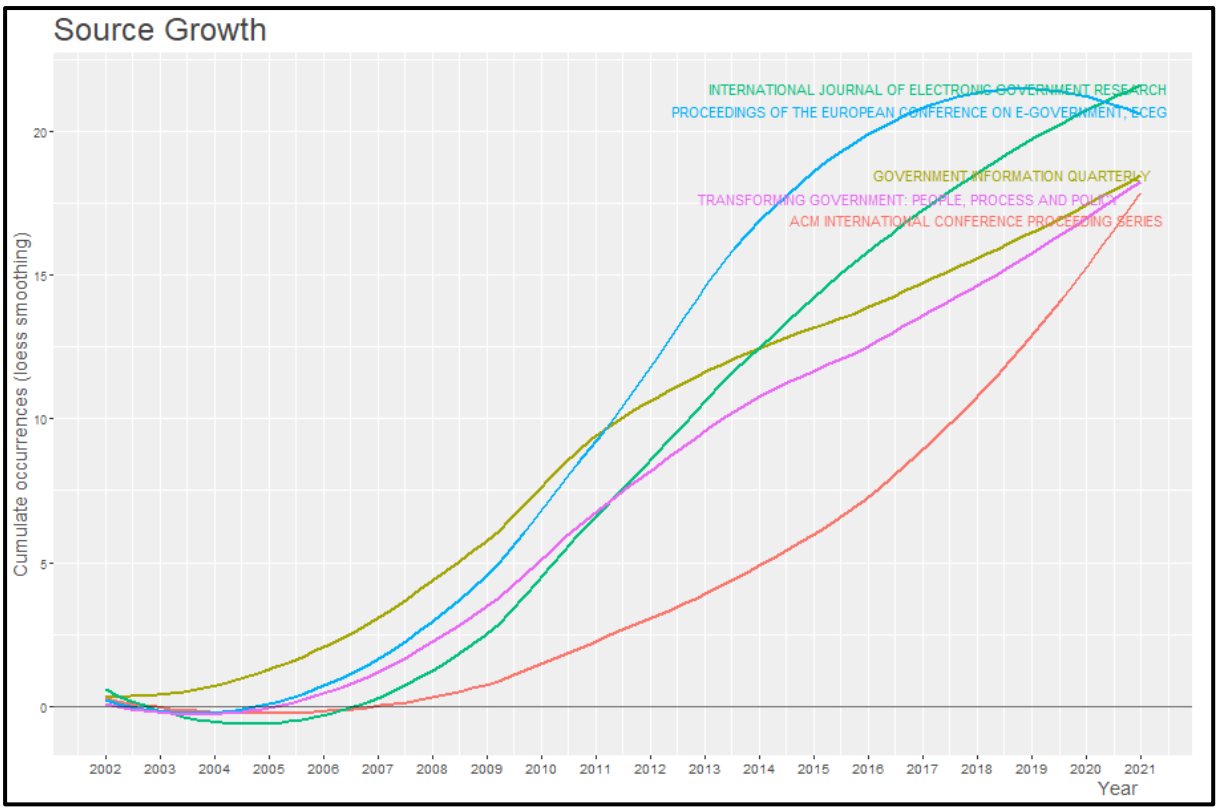

Figure 7: Productivity of journals over the years

Most Frequently Occurring Keywords

Author keywords and keyword-plus were analyzed to determine the frequency of occurrence and relevance of keywords. Table 9 presents the top ten keywords that frequently appear. "e-government" is the author's most frequently appearing keyword, and "government data processing" is the most frequently appearing keyword in keyword-plus. Figure 8 presents the occurrence of author keywords from year to year.

Table 9
Most frequently keywords

Author Kewords	**Occurrences**	**Keywords-Plus**	**Occurrences**
e-government	215	government data processing	145
technology acceptance model	75	e-government	132
trust	57	technology acceptance model	102
tam	47	e-government services	70
adoption	43	e-governments	49
utaut	37	information systems	48
technology acceptance model (tam)	28	developing countries	41
technology acceptance	24	information services	40
e-government services	22	surveys	38
technology adoption	15	perceived usefulness	31

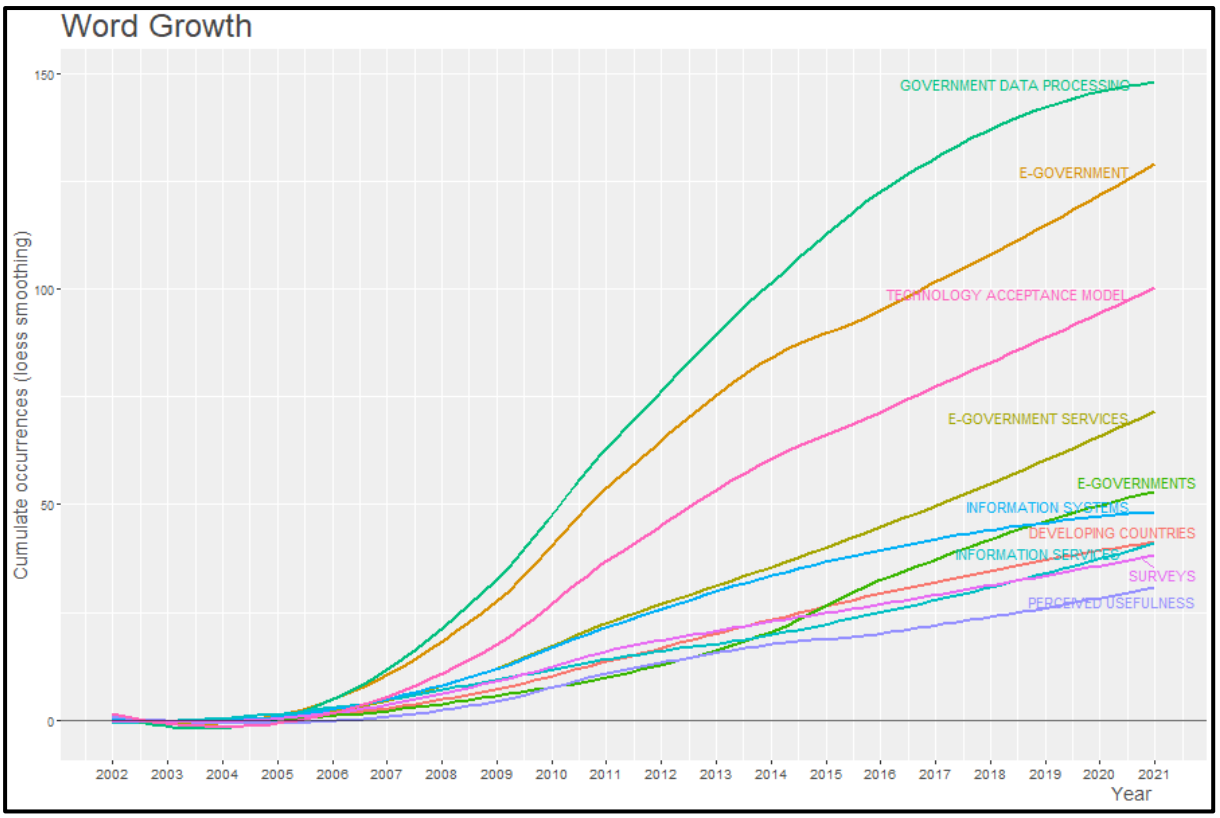

Figure 8: Growth of author keywords

Network Analysis

Co-Citation Analysis

Co-citation analysis is a network conducted by authors to cite articles (Aria & Cuccurullo, 2017). Co-citation will occur after two articles are cited together by another article. Scopus will extract citation data in the co-citation analysis to create a network. The number of articles analyzed is limited to 50. The fifty most cited articles in the references or bibliographies of selected articles are presented in Figure 9. The co-citation map shown in Figure 8 defines four clusters represented by four colors, namely, green, blue, red, and purple. This study provides information that all authors have a co-citation network between one author and another.

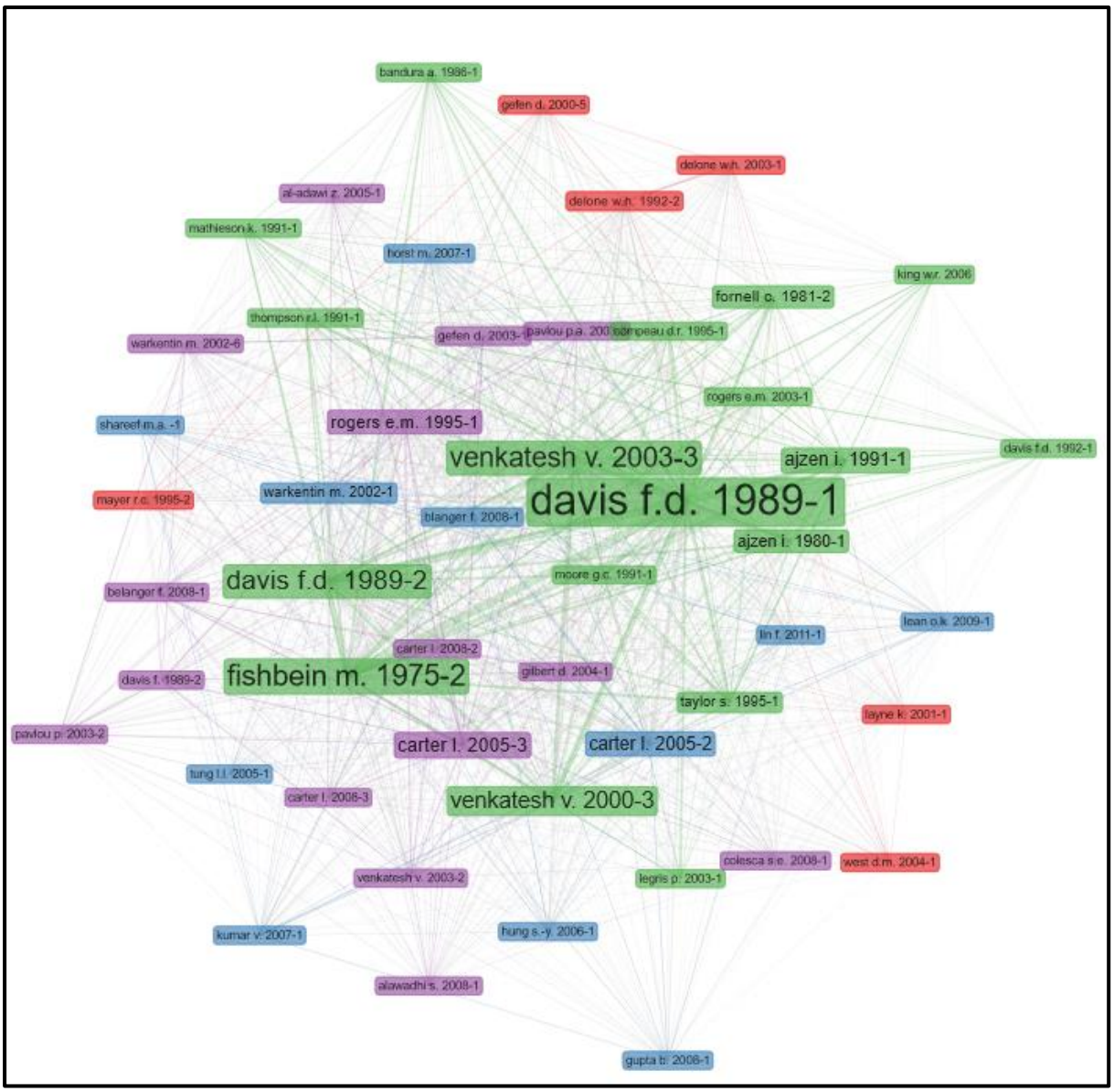

Figure 9: Network showing most co-cited articles

Collaboration Analysis

Metadata downloaded from the Scopus database was subjected to collaboration analysis to create a bibliographic network showing collaboration between authors, affiliations, and countries. The number of nodes was limited to 50. The author collaboration network is presented in Figure 10. Co-authorship is represented by connecting lines, while authors are represented by nodes. Figure 10 shows that there are ten interconnected clusters, revealing strong collaboration among authors in each cluster. The number of co-publications produced is indicated by the size of the text. The larger the text size, the greater the number of co-authored publications. The collaboration network between institutions is shown in Figure 11. There are 3 clusters produced in the network, indicating strong collaboration among the institutions involved. The bibliographic network and collaboration relationships between various countries are presented in Figure 12. The bibliographic network proves that there is strong collaboration among countries involved in e-Government publications, for example, United States, France, Thailand, Korea (red); China, Sri Lanka, Pakistan (Yellow); United Kingdom, Greece, Spain, Portugal (Orange); Malaysia, Indonesia, Iran (Blue).

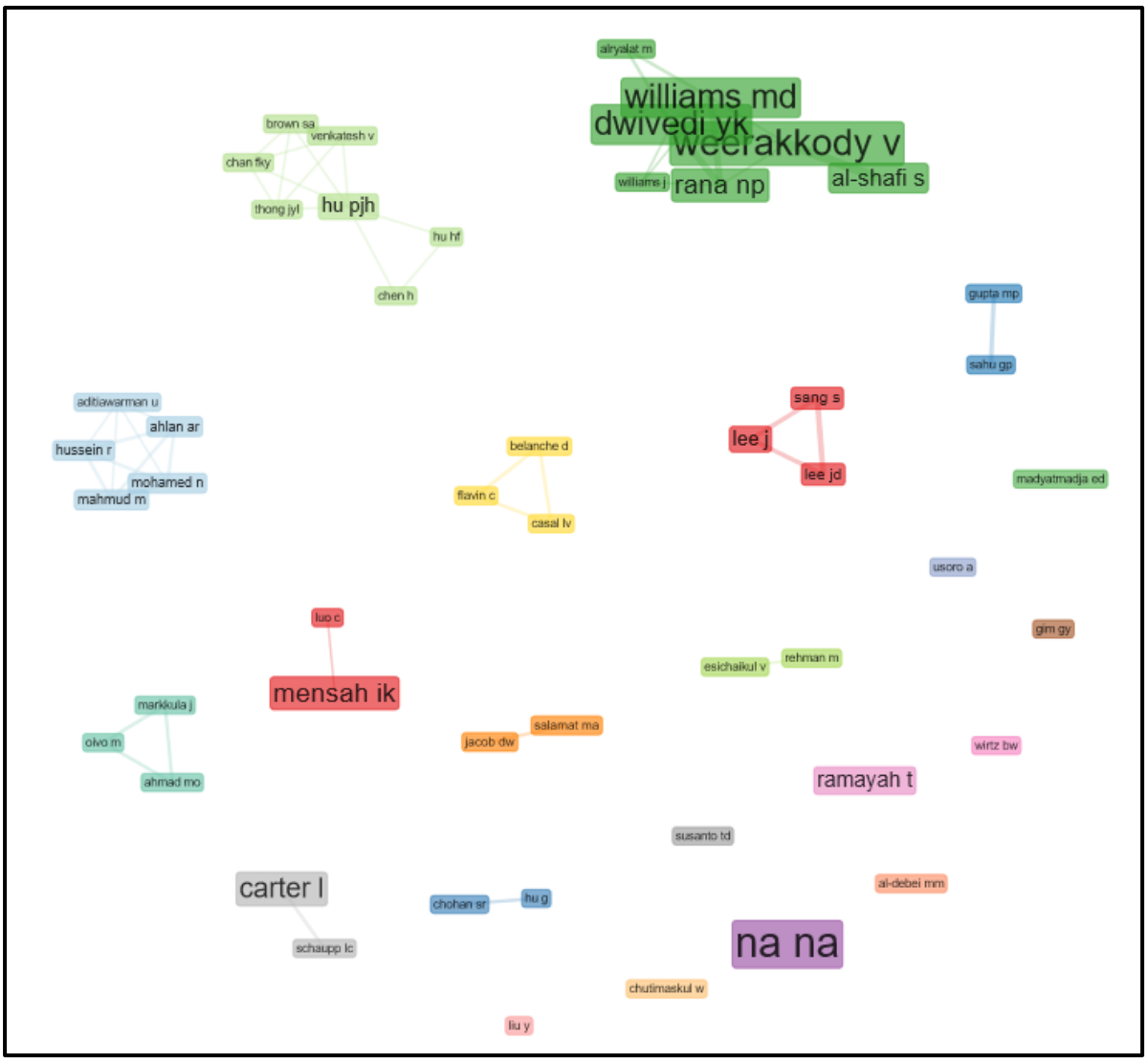

Figure 10: Author collaboration network

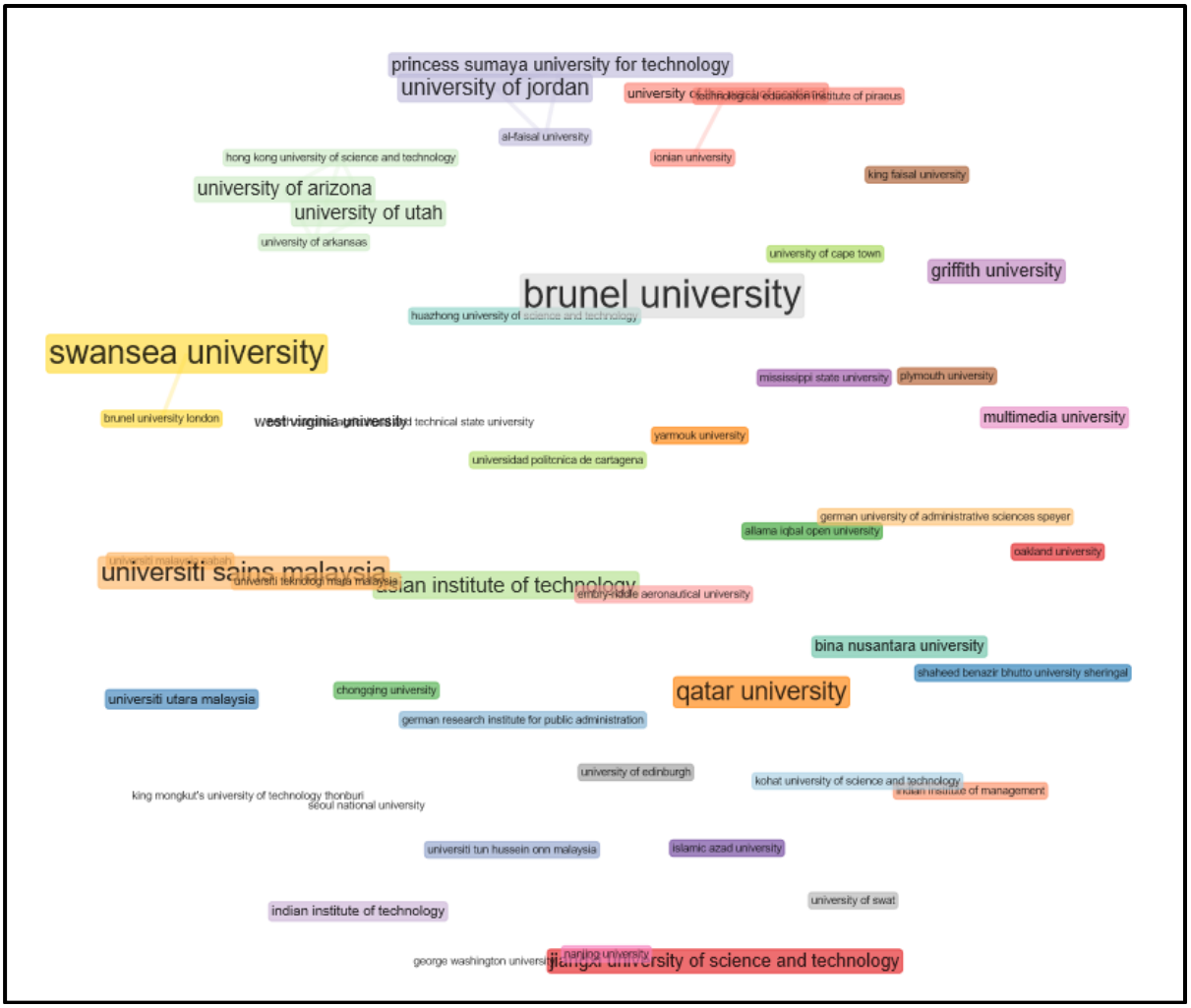

Figure 11: Institutional collaboration network

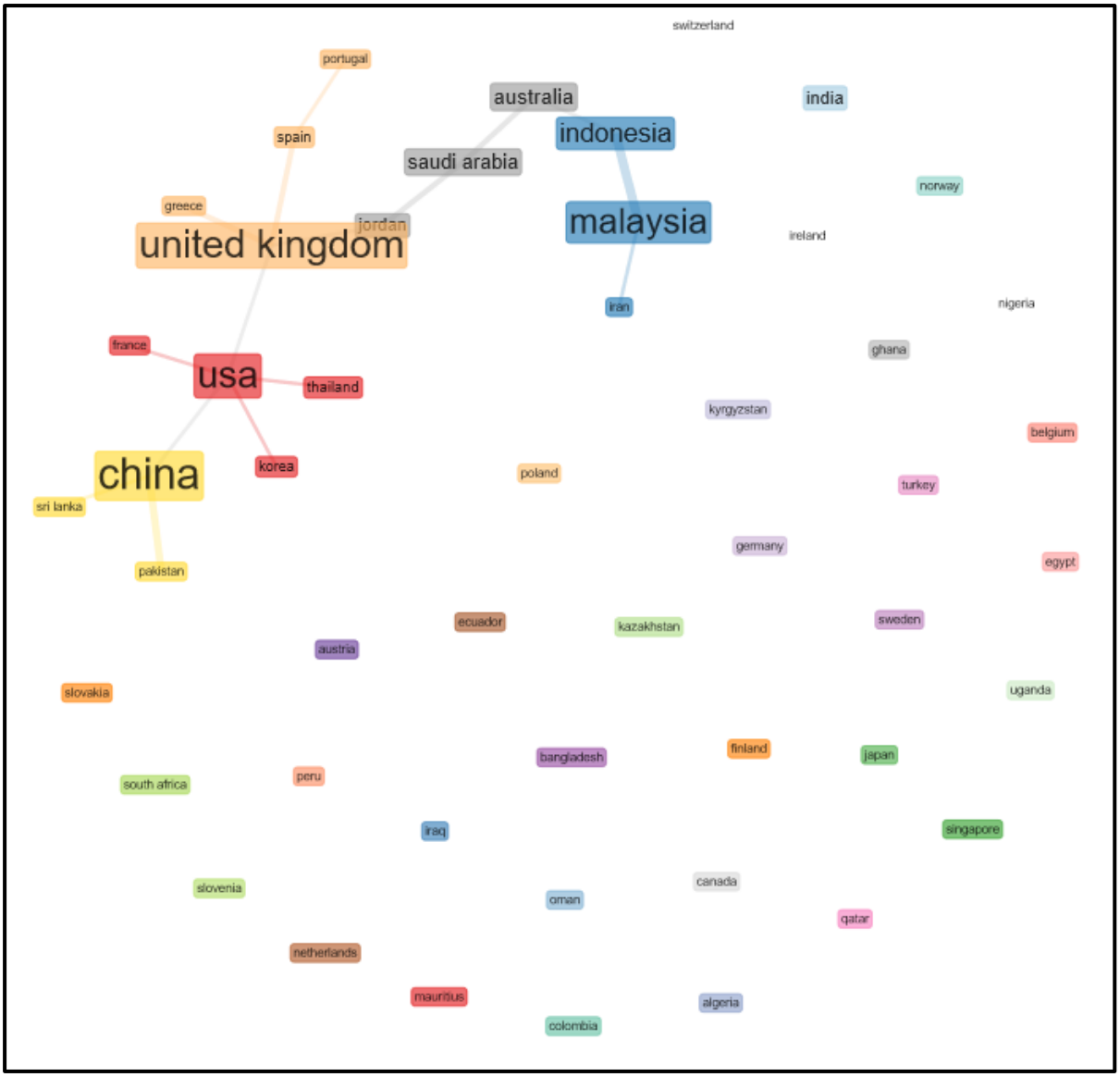

Figure 12: Country collaboration network

Co-word Analysis

Co-word analysis is intended to identify the co-occurrence network and group the keywords of the selected articles. The normalized association method is used to analyze the co-occurrence network of keywords and show the general conceptual framework of the research area. The real essence of the article is the method used to analyze the co-occurrence network applied to the full text, abstract, and keywords (Aria & Cuccurullo, 2017). The co-occurrence network of the author's keywords is presented in Figure 13, and the keywords are limited to 30 nodes. The results of the analysis show that there are four clusters represented by the colors red, green, blue and purple. Grouping two keywords in a cluster is possible when both keywords appear together in one article or several articles.

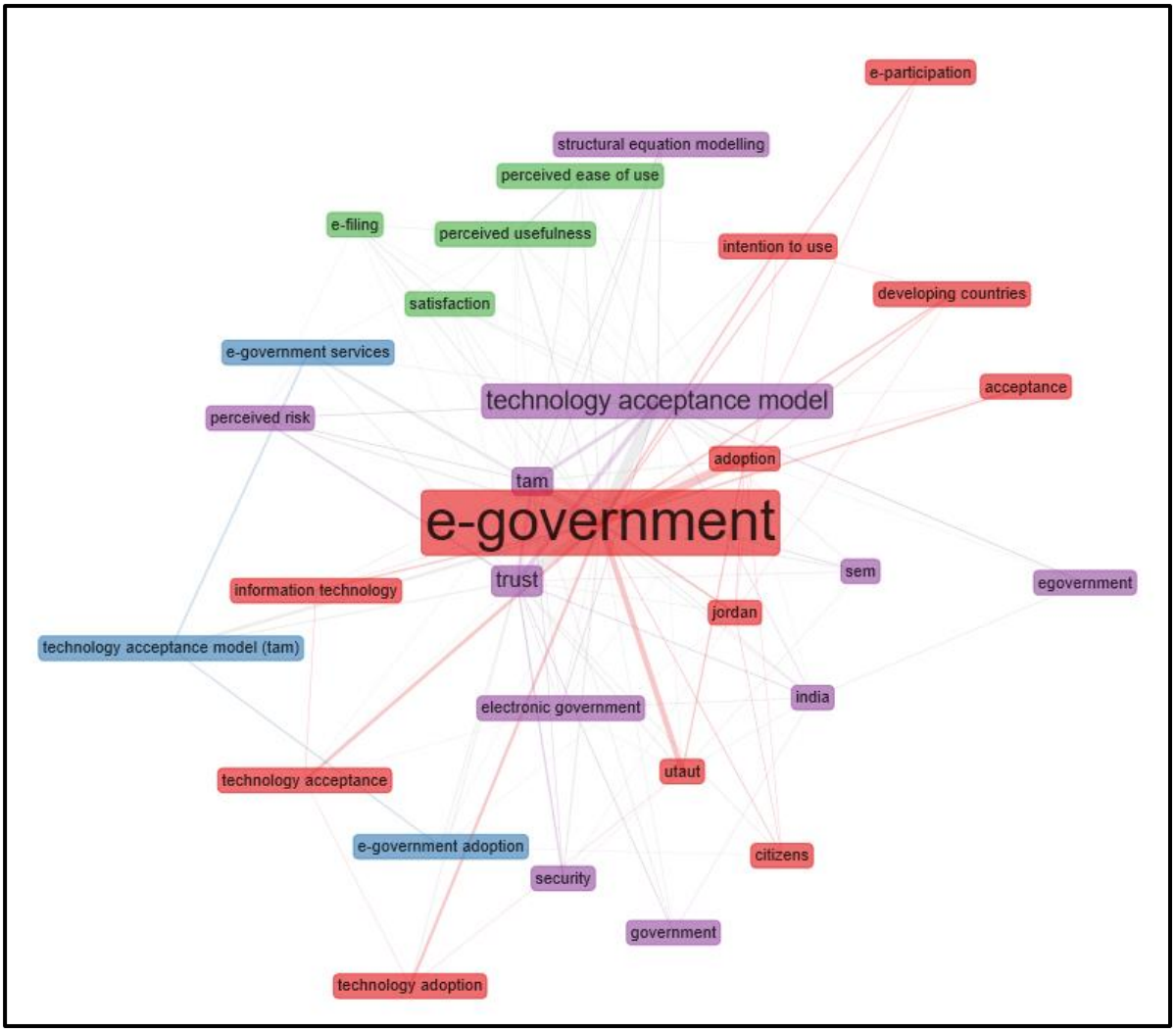

Figure 13: Co-occurrence network

Three-Fields Plot

Journals, countries, and research topics are related and can provide benefits and add insight. Figure 14 presents an innovative three-plane plot, showing the interaction between source (left), author keyword (center), and countries (right) in e-Government research metadata, with nodes limited to 20. The analysis results found that research on e-Government was mostly written by researchers from China and published in the International Journal of Electronic Government Research. Likewise, the Journal Transforming Government People, Process, and Policy also published a lot of research on e-Government and Chinese scholars mostly wrote the studies. In general, China, the USA, the United Kingdom, and Malaysia wrote a lot about e-Government.

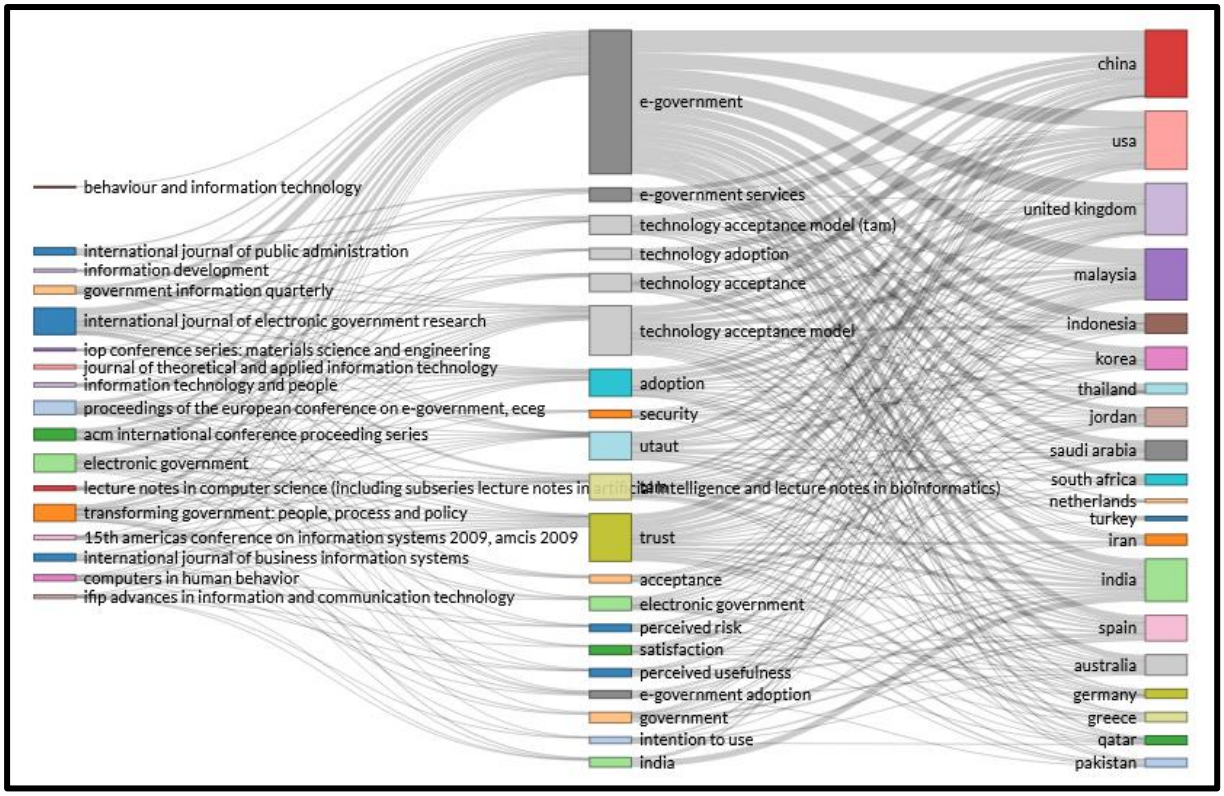

Figure 14: Three Fields plot source-author keyword-country

Historiography

The downloaded data and the most relevant citations from the selected articles became the basis for conducting historiographic analysis and creating a chronological map. Figure 15 shows the results of the historiographic analysis and chronological map of e-Government research publications. Although Huang et al., (2002) were the first authors to study e-Government, Carter and Bélanger (2005) is the most cited article both locally and globally.

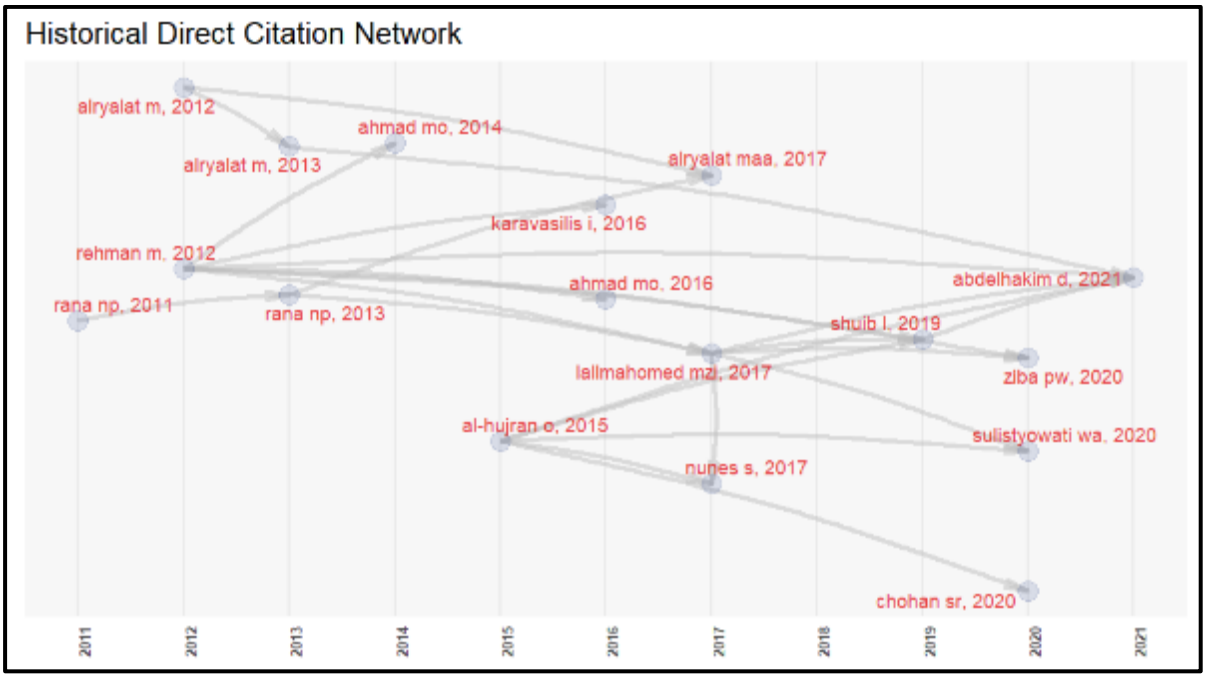

Figure 15: Historical direct citation network

Discussion and Conclussion

In this decade, e-Government has become one of the phenomena in the world. The increasing number of internet users worldwide is one of the reasons for the e-Government phenomenon. There are more than 694 million internet users worldwide, including the United States which contributes 152 million internet users, and the United Kingdom which accounts for 30 million internet users (Carter & Weerakkody, 2008).

The need to use e-Government as one of the tools used to help run the government system more efficiently by utilizing information technology, is evident from the trend and increase in the number of annual publications, as shown in Figure 4. In the metadata taken from the Scopus database, the first article on e-Government using the Technology Acceptance Model was written in 2002. And in the following years the trend of publications on e-Government has increased.

Table 3 lists the top ten productive authors identified from the frequency of publications contributed by each author. “Na Na” is the most productive author with 25 publications, followed by Weerakkody, V with 12 publications, while Mensah, I.K. 11 publications, and Carter, L contributed 10 publications.

The number of citations shows the importance and impact of the studies conducted by leading authors in e-Government research. “Carter L” is the most cited author, which is 2192 citations in ten published articles. The second most cited article is Weerakkody V with 663 citations. And Ramayah T contributed 373 citations. The results of the study show that the most cited articles concentrate on e-Government. This indicates that there is an increasing interest and importance in research in e-Government.

Developed countries are still the most productive countries in producing publications in the field of e-Government. Two ASEAN countries, namely, Malaysia and Indonesia are included in the top ten most productive countries in e-Government publications. Table 6 shows the ten most productive countries, the four most productive countries consisting of Malaysia, China, USA, and the United Kingdom. Meanwhile, the most productive affiliates as shown in Table 7 place Brunel University in first place, followed by Swansea University, both of which come from the United Kingdom. As for the Asian region, the three most productive institutions in e-Government research publications, two from Malaysia and one from Indonesia, namely, Universiti Sains Malaysia, Universiti Utara Malaysia, and Bina Nusantara University.

The journals that published the most research articles on e-Government were “International Journal of Electronic Government Research” and “Proceedings of the European Conference on E-Government, ECEG”, each with 21 research articles. However, the journal with the most citations was “Government Information Quarterly” (1857) with 18 articles, followed by “Transforming Government: People, Process And Policy” with 20 articles having 734 citations, and the third position was occupied by “International Journal of Electronic Government Research” with 254 citations.

Frequency analysis was conducted to determine the co-occurrence of keywords. The keywords “e-government” and “government data processing” were in the first position. The keyword “technology acceptance model (TAM)” was also in the top ten list. Because the

theory used in writing e-Government uses the technology acceptance model. TAM is a theory that is widely used in research on e-government, therefore, the keyword "TAM" was used in the search procedure for relevant articles.

Author, affiliation, and country are used as the basis of the collaboration analysis unit. The results of the study show that there is a strong collaboration between Weerakkody, William, Dwivedi, Rana, al-Shafi and Williams, Figure 10 also shows a strong collaboration between Mohamed, Mahmud, Hussein, Ahlan, and Adhiawarman, Meanwhile, collaboration between institutions as shown in Figure 11, Brunel University collaborates with Huazhong University of Science and Technology, Swansea University collaborates with Brunel University, University of Jordan, Princess Sumaya University for Technology, and Al-Faisal University collaborate with each other, as well as collaboration between the University of Arizona, University of Utah, University of Arkansas, and Hongkong University of Science and Technology. Meanwhile, collaboration between countries can be seen in Figure 12, where the United Kingdom, Greece, Spain, and Portugal collaborate strongly for e-Government research publications. In addition, collaboration also occurs between the USA, France, Thailand, and Korea. Malaysia, Indonesia, and Iran are also seen to be collaborating, as are Saudi Arabia, Jordan, and Australia. Figures 10, 11, and 12 show that there is strong collaboration between authors, affiliations, and countries in e-Government publications.

Figure 13 shows the co-word analysis showing that the keywords "e-government", "adoption", "information technology", "Jordan", "UTAUT", "citizens", "technology adoption", "technology acceptance", "developing countries", "intention to use", and "e-participatio" represented in red are the main clusters in e-Government research publications. The importance of e-Government studies is evident from the second cluster represented in purple. This cluster consists of the keywords, "technology acceptance model", "perceived risk", "TAM", "trust", "SEM", "india", "egovernment", "electronic government", "security", "government", "perceived risk", and "structural equation modeling". The main cluster is connected to other clusters, represented in green and blue. E-Government research publications cannot be separated from the use of the technology acceptance model theory.
The results of the co-citation analysis are shown in Figure 9. The results of the analysis produce four clusters represented by green, blue, red and purple. In the main cluster, namely green, Davis et al., (1989) is the most cited article together, followed by Fishbein M. (1975), and Venkatesh V. (2003). In the second cluster with purple, Rogers E.M. (1995) is the most cited article, followed by Carter L. (2005). Gelone W.H (1992) is the most cited article in the third cluster (red). While in the fourth cluster represented by blue, Carter L. (2005) is the most cited article. The results of the bibliometric analysis reflect the increasing importance of research publications on e-Government. Collaboration among authors from various countries and institutions also strengthens the importance of the research area.

Theoretical Implications
Given the importance of the topic of e-Government, this study uses a bibliometric approach to determine the growth, trends, themes, and influential authors in e-Government research. Although there have been many studies on e-Government, only a few publications on e-Government research use a bibliometric analysis approach.

This article analyzes annual publication trends, most productive authors, most cited articles, most productive countries, most productive affiliations, most frequent journals and most frequent keywords. This article also performs collaboration, co-word, co-citation and historiographic analysis.

This study shows the results of a bibliometric review of four hundred and eighty-seven articles on e-Government published in the Scopus database from 2002 to 2021. These findings indicate the importance of the concept of e-Government, especially after 2006 publications on e-Government have increased significantly. This study reveals that "Na Na", "Weerakkody, V" and "Mensah, I.K." are the most productive authors in publishing e-Government research. Carter and Bélanger (2005) is the first and most cited article with 1287 citations and can be considered as a major study in the field of e-Government. Davis et al., (1989) is the most cited article together, which is a review article on the use of computer technology. Malaysia, China, and USA are the three most productive countries in E-Government publications. While the USA, China, and the United Kingdom are the three countries with the most cited articles. The most productive affiliations are three universities, namely, Brunel University, Swansea University, and Universiti Sains Malaysia. "International Journal of Electronic Government Research" and "Proceedings of the European Conference on E-Government, ECEG" are the sources of documents that publish the most research on e-Government with 21 documents each, but "Government Information Quarterly" is the most cited journal, with a total of 1857 citations. "e-government" and "government data processing" are the most dominant keywords. Keywords that co-occur in the most prominent clusters include "e-government", "adoption", "information technology", "Jordan", "UTAUT", "citizens", "technology adoption", "technology acceptance", "developing countries", "intention to use", and "e-participatio". In addition, strong collaboration between countries is demonstrated by the United Kingdom, Greece, Spain, and Portugal.

Limitation and Future Research

The following are recommendations derived from a comprehensive bibliometric study conducted on research articles on e-Government. The results generated by the bibliometric analysis revealed that the studies conducted were limited to the Scopus database. These results recommend that further research efforts should be directed at the use of other databases, for example, Web of Science, Google Scholar, Dimension, Pubmed, and other databases.

References

Ahmi, A. (2024). *Bibliometric analysis using biblioMagika*. available from https://bibliomagika.com

Ajibade, P., & Mutula, S. M. (2019). Bibliometric analysis of citation trends and publications on e-government in Southern African countries: A human-computer interactions and IT alignment debate. *Library Philosophy and Practice*.

Al-Hadidi, A., & Rezgui, Y. (2010). Adoption and diffusion of m-government: Challenges and future directions for research. *IFIP Advances in Information and Communication Technology*, *336 AICT*(December), 88–94. https://doi.org/10.1007/978-3-642-15961-9

Alcaide–Muñoz, L., Rodríguez–Bolívar, M. P., Cobo, M. J., & Herrera–Viedma, E. (2017). Analysing the scientific evolution of e-Government using a science mapping approach. *Government Information Quarterly*, *34*(3), 545–555.

https://doi.org/10.1016/j.giq.2017.05.002

Alshammari, T., Messom, C., & Cheung, Y. (2022). M-government continuance intentions: An instrument development and validation. *Information Technology for Development*, *28*(1), 189–209. https://doi.org/10.1080/02681102.2021.1928589

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

Avotra, A. A. R. N., Chengang, Y., Sandra Marcelline, T. R., Asad, A., & Yingfei, Y. (2021). Examining the impact of e-government on corporate social responsibility performance: The mediating effect of mandatory corporate social responsibility policy, corruption, and information and communication technologies development during the COVID era. *Frontiers in Psychology*, *12*(October), 1–14. https://doi.org/10.3389/fpsyg.2021.737100

Baker El-Ebiary, Y. A., Bamansoor, S., Abu-Ulbeh, W., Amir, W. M., Saany, S. I. A., & Hafiz Yusoff, M. (2020). A prognosis of Chinese e-governance. *International Journal of Engineering Trends and Technology*, *1*, 86–89. https://doi.org/10.14445/22315381/CATI1P215

Carter, L., & Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal*, *15*(1), 5–25. https://doi.org/10.1111/j.1365-2575.2005.00183.x

Carter, L., & Weerakkody, V. (2008). E-government adoption: A cultural comparison. *Information Systems Frontiers*, *10*(4), 473–482. https://doi.org/10.1007/s10796-008-9103-6

Cortés-Cediel, M. E., Segura-Tinoco, A., Cantador, I., & Rodríguez Bolívar, M. P. (2023). Trends and challenges of e-government chatbots: Advances in exploring open government data and citizen participation content. *Government Information Quarterly*, *40*(4). https://doi.org/10.1016/j.giq.2023.101877

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

Denney, A. S., & Tewksbury, R. (2013). How to write a literature review. *Journal of Criminal Justice Education*, *24*(2), 218–234. https://doi.org/10.1080/10511253.2012.730617

Dias, G. P. (2014). Bibliometric analysis of portuguese research in e-government. *Procedia Technology*, *16*, 279–287. https://doi.org/10.1016/j.protcy.2014.10.093

Dias, G. P. (2019). Fifteen years of e-government research in Ibero-America: A bibliometric analysis. *Government Information Quarterly*, *36*(3), 400–411. https://doi.org/10.1016/j.giq.2019.05.008

Fan, J., & Yang, W. (2015). The study on e-government services quality: The integration of online and offline services. *Journal of Industrial Engineering and Management*, *8*(3), 693–718. https://doi.org/10.3926/jiem.1405

Fauzan, Ibrahim, M. B., & Jahja, A. S. (2022). A scholarly examination of tax compliance: A bibliometric analysis (1960-2021). *Journal of Indonesian Economy and Business*, *37*(1), 52–72. https://doi.org/10.22146/jieb.v37i1.2718

Fauzan, & Jahja, A. S. (2021). Intellectual dynamics of good governance studies: A bibliometric analysis. *Journal of Indonesian Economy and Business*, *36*(2), 155–178. https://doi.org/10.22146/jieb.v36i2.1411

Han, J., Bao, F., Huang, D., Wang, X., Yang, C., Yang, R., Jian, X., Wang, J., Bao, X., & Chu, J. (2020). A universal method to enhance flexibility and stability of organic solar cells by

constructing insulating matrices in active layers. *Advanced Functional Materials*, *30*(38), 1–13. https://doi.org/10.1002/adfm.202003654

Hashim, H. (2024). E-government impact on developing smart cities initiative in Saudi Arabia: Opportunities & challenges. *Alexandria Engineering Journal*, *96*(April), 124–131. https://doi.org/10.1016/j.aej.2024.04.008

Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., & Rafols, I. (2015). The leiden manifesto for research metrics. *Nature*, *520*, 429–431. https://www.nature.com/articles/520429a

Hochstetter, J., Vásquez, F., Diéguez, M., Bustamante, A., & Arango-López, J. (2023). Transparency and e-government in electronic public procurement as sustainable development. *Sustainability (Switzerland)*, *15*(5), 1–24. https://doi.org/10.3390/su15054672

Huang, W., D'Ambra, J., & Bhalla, V. (2002). An empirical investigation of the adoption of egovernment in Australian citizens: Some unexpected research findings. *Journal of Computer Information Systems*, *43*(1), 15–22.

Hung, S. Y., Chang, C. M., & Yu, T. J. (2006). Determinants of user acceptance of the e-Government services: The case of online tax filing and payment system. *Government Information Quarterly*, *23*(1), 97–122. https://doi.org/10.1016/j.giq.2005.11.005

Janita, M. S., & Miranda, F. J. (2018). Quality in e-government services: A proposal of dimensions from the perspective of public sector employees. *Telematics and Informatics*, *35*(2), 457–469. https://doi.org/10.1016/j.tele.2018.01.004

Jiang, H., Wang, S., & Yao, J. (2022). Structuration analysis of e-government studies: A bibliometric analysis based on knowledge maps. *Journal of Information Science*, *48*(5), 676–685. https://doi.org/10.1177/0165551520978346

Joseph, R. C. (2013). A structured analysis of e-government studies: Trends and opportunities. *Government Information Quarterly*, *30*(4), 435–440. https://doi.org/10.1016/j.giq.2013.05.006

Lazar, N., & Chithra, K. (2020). Comprehensive bibliometric mapping of publication trends in the development of building sustainability assessment systems. *Environment, Development and Sustainability*, *23*(4), 4899–4923. https://doi.org/10.1007/s10668-020-00796-w

Milićević, A., Vučković, T., Krstić, D., & Ivić, A. (2023). Information systems integration in e-government: A bibliometric analysis approach. *2023 22nd International Symposium INFOTEH-JAHORINA, INFOTEH 2023*, 1–5. https://doi.org/10.1109/INFOTEH57020.2023.10094140

Napitupulu, D., & Yakub, R. (2021). A bibliometric analysis of e-government research. *Library Philosophy and Practice*, 1–19.

Nulhusna, R., Sandhyaduhita, P. I., Hidayanto, A. N., & Phusavat, K. (2017). The relation of e-government quality on public trust and its impact on public participation. *Transforming Government: People, Process and Policy*, *11*(3), 393–418. https://doi.org/10.1108/TG-01-2017-0004

Rakhman, R. A., Anggraini, N., Legowo, N., & Kaburuan, E. R. (2019). A design of government enterprise architecture framework based on g-cloud services. *International Journal of Scientific and Technology Research*, *8*(9), 1692–1700.

Sabani, A. (2020). Investigating the influence of transparency on the adoption of e-government in Indonesia. *Journal of Science and Technology Policy Management*, *12*(2), 236–255. https://doi.org/10.1108/JSTPM-03-2020-0046

Sabani, A., Deng, H., & Thai, V. (2018). A conceptual framework for the adoption of e-

government in Indonesia. *ACIS 2018 - 29th Australasian Conference on Information Systems*, 1–13. https://doi.org/10.5130/acis2018.bi

Sánchez-Torres, J. M., & Miles, I. (2017). The role of future-oriented technology analysis in e-Government: a systematic review. *European Journal of Futures Research*, *5*(1). https://doi.org/10.1007/s40309-017-0131-7

Sharma, S. K., Al-Badi, A., Rana, N. P., & Al-Azizi, L. (2018). Mobile applications in government services (mG-App) from user's perspectives: A predictive modelling approach. *Government Information Quarterly*, *35*(4), 557–568. https://doi.org/10.1016/j.giq.2018.07.002

Song, Y., Natori, T., & Yu, X. (2024). Tracing the evolution of e-government: A visual bibliometric analysis from 2000 to 2023. *Administrative Sciences*, *14*(7), 133. https://doi.org/10.3390/admsci14070133

Stefanovic, D., Milicevic, A., Havzi, S., Lolic, T., & Ivic, A. (2021). Information systems success models in the e-government context: A systematic literature review. *20th International Symposium Infoteh-Jahorina*, 1–7.

Venkatesh, V., Thong, J. Y. L., Chan, F. K. Y., Hu, P. J. H., & Brown, S. A. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. *Information Systems Journal*, *21*(6), 527–555. https://doi.org/10.1111/j.1365-2575.2011.00373.x

Weigl, L., Roth, T., Amard, A., & Zavolokina, L. (2024). When public values and user-centricity in e-government collide – A systematic review. *Government Information Quarterly*, *41*(3), 101956. https://doi.org/10.1016/j.giq.2024.101956

Yeh, H. (2017). The effects of successful ICT-based smart city services: From citizens' perspectives. *Government Information Quarterly*, *34*(3), 556–565. https://doi.org/10.1016/j.giq.2017.05.001

Yusriadi, Akib, H., & Ihsan, A. (2017). Bureaucratic reform in public service: A case study on the one stop-integrated service. *Mediterranean Journal of Social Sciences*, *8*(2), 253–258. https://doi.org/10.5901/mjss.2017.v8n2p253

Zakaria, R., Ahmi, A., Ahmad, A. H., Othman, Z., Azman, K. F., Ab Aziz, C. B., Ismail, C. A. N., & Shafin, N. (2021). Visualising and mapping a decade of literature on honey research: A bibliometric analysis from 2011 to 2020. *Journal of Apicultural Research*, *60*(3), 359–368. https://doi.org/10.1080/00218839.2021.1898789

Zurita, G., Shukla, A. K., Pino, J. A., Merigó, J. M., Lobos-Ossandón, V., & Muhuri, P. K. (2020). A bibliometric overview of the journal of network and computer applications between 1997 and 2019. *Journal of Network and Computer Applications*, *165*(April). https://doi.org/10.1016/j.jnca.2020.102695