Trends in the Publication of the Effectiveness and Impact of Digitalization in Population Administration: A Systematic Review

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ABSTRACT

This research analyzes publication trends and the relationships between research topics in population administration. The five main aspects studied are the distribution of articles per year, publication trends based on country affiliation, publication trends based on institutional affiliation, the number of citations per article, and the relationship between research topics. The results show fluctuations in the number of publications per year, with a peak occurring in 2019, reflecting an increased interest during that period. Indonesia has emerged as a major contributor to publications, highlighting the importance of this topic in the country, particularly concerning the challenges in managing population data. Sepuluh Nopember Institute of Technology (ITS) has become the institution with the most publications, demonstrating a strong focus on this research. Citation analysis shows that older articles tend to have a greater impact, although newer articles may take time to be recognized. The relationship between the research topics shows a close connection between technological innovation, public services, and policy implementation in population administration. In conclusion, although there has been progress, there are still challenges in sustainability and equitable distribution of research, necessitating further collaboration and innovation to enhance impact in this field.

1. INTRODUCTION

Population administration plays a vital role in effective governance, as it involves the recording and management of important data regarding the population. This data is used for various purposes such as development planning, resource allocation, and the provision of efficient public services. In this digital era, many countries have begun to adopt digital technology to replace traditional manual systems that are often prone to errors. Digital transformation in population administration aims to enhance efficiency, accuracy, and transparency, thereby facilitating access to the data needed by the government and the public. This aligns with the findings of Frohman [1], who proposed at the end of the 1960s the automation of population records and the establishment of a contemporary and integrated national population system, as well as the lack of public trust and concerns over personal data leaks [2].

The digitization of population administration brings various benefits, including increased operational efficiency and data reliability. Through the use of an integrated population information system, the process of recording and managing data becomes faster and more accurate. Research shows that countries that have successfully implemented digital technology in population administration, such as Estonia and India, have experienced a significant increase in data processing speed and a reduction in human errors.

Furthermore, digitization also allows for the integration of population data with other public services, such as health and education, which can enhance the quality of services provided to the community. The findings of the research by Dayanti et al. [3] indicate that village officials possess skills in managing village-level population administration. However, there is a lack of resources due to the limited number of operators providing online services compared to the numerous applications waiting in line [4].

However, this digital transformation also faces various significant challenges. Inadequate technology infrastructure, a lack of technological skills among employees, and resistance to change from manual to digital systems are the main obstacles to the implementation of digitalization in population administration. In addition, the issues of security and data privacy have become important concerns, as digitalization increases the risk of unauthorized access and misuse of personal data. Therefore, strong policies and regulations are needed to address these challenges and ensure that the population's data is well protected. Public participation and community awareness also play a crucial role in ensuring the success of the digitalization of population administration, through effective education and socialization campaigns. In addition, the research findings of Santoso and Riyadh [5] highlight the need for increased community awareness initiatives and robust technological infrastructure to optimize the effectiveness of the Poedak application in rural population

administration.

The development of research on the effectiveness and impact of the digitalization of population administration shows varied results across different countries. The initial study focuses on the application of electronic information systems to replace manual methods that are prone to errors and inefficiencies. For example, research in Estonia and India shows that digitalization can significantly reduce processing time and operational costs. Digitalization enables the integration of population data with other systems such as health and education, which enhances the quality of public services. The research also found that countries with adequate technological infrastructure and strong policy support are more successful in implementing these digitalization systems. However, in many developing countries, challenges such as limited infrastructure and resistance to change remain major obstacles to the implementation of this technology. Meanwhile, the findings of the research by Setiabudhi et al. [6] indicate that the administration of population services in Manado City is not optimal yet because there are no regional regulations issued or established to accommodate all the unique aspects, and the lack of human resources, both in terms of quality and quantity, hampers the provision of population administration services to the community [6].

In addition, data security and privacy issues have become a significant focus in recent research. With the increasing use of digital technology, the risks of unauthorized access and misuse of personal data are rising. Research shows that strict regulations and strong security protocols are essential for protecting residents' data. Countries that successfully protect their citizens' data privacy typically have comprehensive data protection policies and advanced encryption technologies. Another challenge identified in the research is the lack of technological skills among civil registration administrative staff, which often requires ongoing training and education. In addition, community participation and public awareness of the importance of accurate and secure population administration are crucial factors in ensuring the success of digitization. Research shows that effective education and socialization campaigns can enhance public participation, which in turn improves the accuracy and reliability of demographic data. The statement reinforces the findings of Mykhaylov and Pravousud [7], which examined the issues of Public Administration Development in the field of local government in Ukraine in the context of ensuring public trust. It should be noted that the National Security Strategy of Ukraine extends until 2030, providing an increase in the level of security for the nation and the public, including through the development of democracy and civil society, ensuring personal safety and high living standards. At the same time, the security system from the perspective of an isolated approach requires detailed consideration within the framework of further research, particularly studies on the level of trust as a factor of national, regional, and local security [7]. In addition, Supriyanto's [8] findings indicate that the factors hindering the quality of population administration services in Malang City are due to a lack of human resources in terms of both quantity and quality, as well as the availability of supporting infrastructure.

One of the main advantages of the digitization of population administration is the increase in efficiency and accuracy in managing population data. By using digital technology, the process of recording and managing data becomes faster and more accurate, reducing human errors that often occur in manual systems. Studies show that digitalization can accelerate data processing times and reduce operational costs, which is highly beneficial for the government in providing public services. Moreover, digitalization allows the integration of demographic data with other systems such as health and education, enhancing coordination across sectors and improving the overall quality of public services. Digital technology also facilitates access for citizens to update their information, making the available data more up-to-date and relevant. The research findings can reinforce Baihaqi's [9] opinion, as a literature review from 2017-2021 found that the most commonly used method for developing web-based population administration information systems is the software development life cycle method.

As for research gaps, in the future, further exploration of digital innovation with a participatory approach involving the community can open up opportunities for a more inclusive and sustainable system [10]. In addition, research gaps in the aspects of organizational culture factors, digital literacy levels, knowledge of system use [11], and the development of automation tools to collect and analyze performance data in real-time also need to be done [12]. Future research could also explore global colonial patterns of civil registration [13] and extend the study to other regions to understand the cultural and social contexts that influence the relationship between competence, ethics and service quality [14]. Meanwhile, research topics that are interconnected and contribute to future research are themes related to the issues of government administration studies, public services, regional institutions, and data integration. These themes relate to research studies on public service cards, demographic data integration, public awareness and public understanding of population administration in remote and outermost areas. The research themes that are still rarely carried out by global research and publications on the Scopus database are issues of public service, target community, human resources, and demographic data integration.

However, the digitization of population administration also has several significant drawbacks. One of the biggest challenges is data security and privacy. With the increasing use of digital technology, the risks of unauthorized access and misuse of personal data have become higher. Many countries are still struggling with adequate regulations and security protocols to protect their citizens' data. In addition, inadequate technological infrastructure and a lack of technological skills among civil registry administrative staff pose obstacles to the implementation of digital systems. Resistance to change from manual to digital systems is also a significant challenge, as many employees and citizens are not yet accustomed to this new technology. Low public participation and a lack of community awareness about the importance of accurate and secure population administration can also hinder the success of this digitization. Therefore, a comprehensive and coordinated effort is needed to address these challenges and ensure that the benefits of digitalization can be optimized.

2. METHOD

This research methodology employs the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method to filter and select relevant articles from various sources [15]. PRISMA is a highly systematic and transparent approach aimed at ensuring that the processes of searching, selecting, and including articles are conducted

thoroughly and can be replicated. At the identification stage, the search for articles was conducted in two main databases, namely Crossref and Scopus. From the Crossref database, 1,000 articles were found, while 250 articles were found in Scopus, resulting in a total of 1,250 initial articles obtained. This stage is important for obtaining a broad and relevant literature coverage related to the research topic being addressed.

After the identification stage, a screening process is conducted to eliminate duplicate articles. In this study, a total of 700 articles identified as duplicates were found, leaving 550 articles that are free of duplication. Further screening was conducted to exclude articles that are not journals, such as books, proceedings, and other manuscripts. At this stage, 200 articles were eliminated, leaving 350 articles that still meet the criteria to proceed to the next stage. This screening stage is very important to ensure that the remaining articles are truly relevant and aligned with the research focus, as well as meeting the standards set in this study.

At the eligibility stage, articles that have passed screening are further examined to ensure that they meet the established inclusion criteria. These criteria include the availability of

articles in PDF format and their suitability for the desired language, which is Indonesian. Out of 350 articles, only 300 have accessible PDF files, and from this number, an additional 50 articles were eliminated because they do not use the Indonesian language. This stage is crucial for maintaining the quality of the research, ensuring that all articles used are not only relevant but also accessible and thoroughly analyzable.

The final stage is the inclusion stage, where the articles that have passed all previous processes are finally included in the research analysis. Out of a total of 300 articles that met the initial criteria, only 12 articles were selected to be included in the final study. These articles were selected based on the highest relevance to the researched topic and strict inclusion criteria. By using the PRISMA method, this research ensures that only the most relevant and high-quality literature is utilized, so that the research results can be reliable and make a significant contribution to the understanding of the field of population administration. This process emphasizes the importance of careful literature selection to ensure the accuracy and validity of research findings. The research design can be seen in Figure 1 as follow:
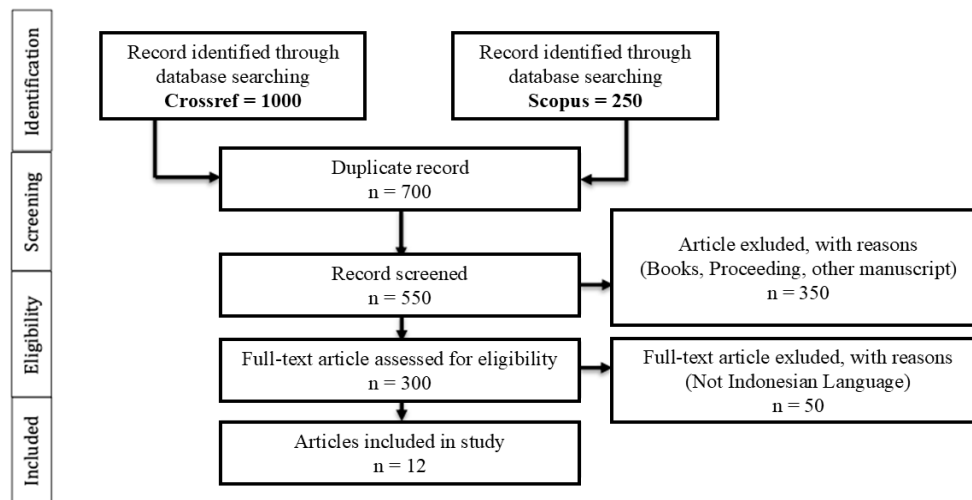

Figure 1. Research design

3. RESULT AND DISCUSSION

3.1 Trends in scientific article publications per year on population administration

The trend in scientific article publications per year on population administration has shown a significant increase in the last decade, in line with the growing importance of digitalization and effective population data management. Initial research focused more on the aspects of user satisfaction with the population administration system, the implementation of e-government for complaints, changes to family card biodata using applications, effective use of SIAK, and the website application for population administration. However, in recent years, topics such as data security, privacy, and information system integration have begun to dominate the literature. This increase is also driven by the urgent need to address global challenges such as migration, urbanization, and efficient public services. Developing countries are showing an increasing interest in the digitalization of population

administration as an effort to enhance the transparency and efficiency of their governance. In addition, advancements in Information and Communication Technology (ICT) along with support from international and national policies have encouraged academics to explore various innovations in population administration. This trend reflects a shift from traditional manual methods to a more integrated and technology-based system, with the primary goal of improving data accuracy and the quality of public services. The trend of publications on population administration per year can be outlined as shown in the following image.

3.1.1 Distribution of articles per year

The trend of publications on population administration per year can be described in the following Figure 2.

Figure 2, presented here, shows the variation in the number of articles published each year in the field of population administration, based on data from Scopus up to the year 2024. The year 2019 showed the highest research activity, with three articles published. This surge may reflect an increased interest

or urgent need for innovation and evaluation in population administration during that year [12]. This condition can be triggered by the development of new technologies or policy changes that require more intensive research. As an introduction, the new digital system in managing population data or changes in decentralization policies could be a factor driving the increase in publications [16].
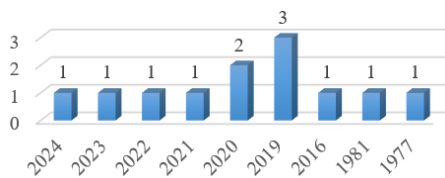

Figure 2. Distribution of articles by year

After the peak in 2019, there was a slight decline in 2020 with two articles published. In the following years, from 2021 to 2024, the number of articles published per year remained stable at one. This decline may indicate that despite an initial push for research, challenges in implementation or a decrease in interest could affect the sustainability of research in this field. Stability at the rate of one article per year can also reflect the consolidation or completion of research that was initiated in the previous period. Researchers working in this field may need to further explore whether this decline is due to a lack of funding, divided attention with other topics, or difficulties in translating research into real-world practice.

From a historical perspective, the oldest articles listed in the graph date back to 1977 and 1981, indicating that interest in population administration has existed for a long time, albeit with lower intensity compared to recent decades. The increased research activity in the last decade, especially in 2019-2020, indicates the emergence of new developments that are intriguing to researchers. However, to maintain this momentum, there needs to be a continuous focus on innovation and adaptation to new challenges in population data management. In this context, academics and policymakers may need to collaborate to identify areas that still require further research and to ensure that research findings can be effectively implemented in population administration practices.

Research on population administration covers various important topics to ensure effective and efficient management of population data [17]. One of the main topics is the digitalization of the population administration system, which aims to enhance operational efficiency and data accuracy through the implementation of information technology [18]. In addition, the issues of security and data privacy have become the focus of research, considering the importance of protecting personal data in the digital age. The research also explores policies and regulations that support population administration, highlighting the importance of a strong legal framework to govern the recording and management of population data. Implementation challenges, such as limitations in technological infrastructure and resistance to change, are other important aspects that are studied to understand the barriers to implementing digital systems. The integration of population data with other public services, such as health and education, is also a topic that is often discussed to improve coordination between sectors and the quality of services. Lastly, public participation and community awareness regarding the importance of accurate and up-to-date population data have become the focus of research, with efforts to enhance citizen engagement through educational campaigns and outreach. The mapping of these topics provides a comprehensive view of the various aspects that influence population administration and the steps that can be taken to optimize it.

3.1.2 Publication trend based on country affiliation

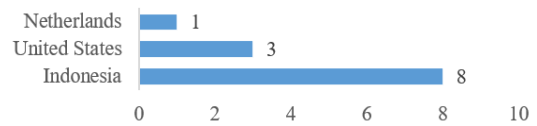In this section, the trend of publications made by researchers globally can be described in Figure 3 below.

Figure 3. Publication trends based on country affiliation

The data presented in Figure 3 shows the distribution of publications based on country affiliation, with Indonesia being the country that published the most articles related to population administration, totaling 8 articles. This amount is much higher compared to other countries, indicating that this topic is a major focus in Indonesia [19]. This may be due to the unique challenges faced by Indonesia in terms of population administration, such as managing large and dispersed population data across many islands, as well as the need to improve public services through the implementation of technology [18]. High publication rates can also reflect strong support from the government and academic institutions in Indonesia for research in this field, likely driven by efforts to improve the quality of administration and public services across the country [3].

The United States ranks second with 3 publications. Although the number is smaller compared to Indonesia, this contribution is still significant as it shows that there is interest in the topic of population administration in that country. Research in the United States may focus more on certain aspects, such as technological innovation, population data management, or broadly applicable public policies [20]; Considering the background of the United States in technology development and policy, research conducted in this country can provide important contributions to creating innovative solutions that can be adopted by other countries [17]. The participation of the United States in this research also indicates the potential for international collaboration that could enrich the global approach to population administration [21].

Meanwhile, the Netherlands has only contributed 1 publication related to population administration. This amount indicates that this topic may not be a primary focus for researchers in the Netherlands, or there may be specific contexts that make this research more limited. However, although the amount is small, the contribution from the Netherlands is still valuable, especially when considering the quality of research that may be more focused on certain aspects, such as the integration of technology in public administration or population data management in the context of developed countries [22]. The participation of the Netherlands could also open up opportunities for collaboration with other countries that have similar interests, thereby expanding the impact of research in this field. Overall, this graph shows that although there are differences in the number of publications across various countries, each contribution remains important in shaping a more comprehensive understanding of population administration.

Figure 3 shows the trend of publications based on country

affiliation, with Indonesia, the United States, and the Netherlands being the top producers of articles on population administration issues. Based on Scopus data, Indonesia has produced 8 documents published from 1977 to 2024. This makes Indonesia the most dominant in analyzing issues of population administration and digitalization policy. The issues raised can provide understanding and effective strategies from the government in addressing the challenges of digitalizing population administration. In addition to Indonesia, several countries contributed publications, namely the United States with 3 documents and the Netherlands with 1 document, which were produced in publishing articles on population administration issues during the period from 1977 to 2024. Publication trend data from Scopus indicates that there is still a lack of published documents produced by researchers from 5 continental regions: Asia, Europe, America, Africa, and Australia. This research suggests the expansion of studies on the effectiveness and digitalization of population administration to be conducted in five continental regions, to enhance the trend of publications in the future regarding the issues of effectiveness and digitalization of population administration. The minimal publication of articles by researchers globally on the issue of population administration could encourage an increase in publications and provide a more productive contribution to exploring new perspectives in the field of scientific research.

Meanwhile, the Netherlands has only contributed one publication related to population administration. This amount suggests that this topic may not be a primary focus for researchers in the Netherlands, or there may be specific contexts that restrict this research. However, even though the amount is small, the contribution from the Netherlands is still valuable, especially when considering the quality of research that may be more focused on certain aspects, such as the integration of technology in public administration or population data management in the context of developed countries [20]. The participation of the Netherlands could also create opportunities for collaboration with other countries that share similar interests, thus broadening the impact of research in this area. Overall, this graph indicates that while there are variations in the number of publications among different countries, each contribution is significant in developing a more thorough understanding of population management.

Figure 3 illustrates the trend of publications according to country affiliation, with Indonesia, the United States, and the Netherlands emerging as the leading contributors of articles on population administration issues. Based on Scopus data, Indonesia has produced 8 documents published from 1977 to 2024. This positions Indonesia as the most dominant in analyzing issues related to population administration and digitalization policy. The issues raised can offer insights and effective strategies for the government in tackling the challenges of digitizing population administration. In addition to Indonesia, several countries contributed publications, namely the United States with 3 documents and the Netherlands with 1 document, which were produced in publishing articles on population administration issues during the period from 1977 to 2024. Publication trend data from Scopus indicates that there is still a lack of published documents produced by researchers from five continental regions: Asia, Europe, America, Africa, and Australia. This research suggests expanding studies on the effectiveness and digitalization of population administration to be conducted across five continental regions, to boost the trend of future

publications on the issues of effectiveness and digitalization in population administration. The limited publication of articles by researchers worldwide on the topic of population management could stimulate an increase in publications and offer a more fruitful contribution to exploring new perspectives in the field of scientific research.

3.1.3 Publication based on affiliations

Table 1 below describes the publication trends based on affiliations:

Table 1. Publication trends based on affiliation

Affiliation Agency	Amount
Sepuluh Nopember Institute of Technology	3
Kaweah Delta Medical Center	1
University of Palembang	1
Musi Charitas Catholic University	1
STIE Rahmaniyah Sekayu	1
STIA Satya Negara Palembang	1
Western Michigan University	1
VA Medical Center	1
University of California, Davis	1
Radboud Universiteit	1
State University of New York at Fredonia	1
UC Davis School of Medicine	1
Universitas Atma Jaya Yogyakarta	1
Universitas Islam Negeri Syarif Hidayatullah Jakarta	1
Universitas Prof. Dr. Moestopo, Beragama	1

The data presented in Table 1 shows the distribution of publications based on institutional affiliation, with the Sepuluh Nopember Institute of Technology (ITS) standing out as the largest contributor. It has recorded around 3 publications, placing it as the institution with the highest number of publications on the list. The dominance of ITS shows that this university has a strong research focus, particularly on topics related to technology and population administration. ITS, as one of the leading technology universities in Indonesia, is likely to have specific programs or initiatives that support research in this area. The high number of publications from ITS also reflects a significant investment in human resources and technology to promote high-quality research, which in turn strengthens its academic reputation at both national and international levels.

Other institutions on the list, such as Palembang University, Musi Charitas Catholic University, and STIE Rahmaniyah Sekayu, as well as several international universities like UC Davis School of Medicine and Western Michigan University, each recorded around one publication. This distribution indicates that although there are contributions from various institutions, many of them only have one or two publications related to the analyzed topic. This could reflect a more dispersed research focus across various other fields or perhaps resource limitations that restrict these institutions' ability to contribute more to this specific research. The relatively small contributions from several international universities are also interesting, as they indicate that although this topic is globally relevant, the focus or interest in certain countries may be more limited.

Overall, this data provides important insights into the role and contributions of institutions in research in specific fields. The dominance of ITS in publications indicates a strong research capacity and focus at the university, which can serve as a model for other institutions. For institutions with lower

publication contributions, this can be a catalyst to enhance their research efforts, either through internal capacity building or by collaborating with more active institutions. Increasing the number of publications and participation in research can help strengthen their position in the academic community, both nationally and internationally. In addition, by observing this uneven distribution, policymakers and research managers in various institutions may need to consider strategies to support and encourage more equitable research across institutions, so that knowledge and innovation in this field can be more widely disseminated.

The impact of this research globally according to Table 1. namely publication trends based on affiliation by Anityasari and Indriasari [19] where research can focus more on developing e-government platforms that support real-time administrative services. Further research can be directed at developing a more comprehensive system evaluation method so that population administration services in regional sharing can be more efficient, responsive and innovative [10]. Future research could focus on strengthening administrative policies to support cultural competency enhancement through continuous training for team skills improvement and results-based development to improve access and quality of services [16]. Meanwhile, research implications focus on the need for differential improvement in designing and managing services based on the type of users both internal and external (2023) and the need for improvement and standardization of performance measurements that are more specific and relevant for administrative service processes [12]. The implication of this finding can expand the scope of the system so that all work units at the government level such as sub-district villages can be integrated and more advanced in the application of technology to improve data security [11]. The application of modern analytical methods such as digitization and big data [13], as well as the development of policies and training programs aim to improve the competence of population administration employees, both in technical and interpersonal aspects [14]. Referring to this description, the impact of research trends is in accordance with the author's affiliation, namely on the management of population administration complaints, utilization of the Population Administration System (*Sistem Administrasi Kependudukan*, SIAK), administrative service culture, population website applications, system evaluation, population administration improvement priorities, population system development, staffing competencies, and public service dynamics.

3.2 The relationship between different research topics and future research gaps

The linkage of the research topic on the effectiveness and digitalization of population administration can influence further research topics. The following are some research topic relationships that have been conducted by global researchers, as well as the connections between different studies. Figure 4 shows that previous research is divided into four interconnected clusters related to the effectiveness and digitalization of population administration as follows: in the first cluster, there are several different but closely related research topics, namely implementation studies, opportunities in population administration, public policy, community awareness, and social protection. In the second cluster, there are several closely related research topics, including civil registration office service issues, population administration studies, catchment issues, and service quality studies. In the third cluster, several previous studies are closely related, including resource studies, population administration issues, and public service studies. Meanwhile, in the fourth cluster, there are studies with several closely related issues, including administration service studies and service innovation studies.

The relationship between various research topics in population administration shows that although significant progress has been made, there are substantial gaps that need to be explored further. For example, research on digitalization and operational efficiency has revealed many benefits, yet there is still a lack of in-depth studies regarding the long-term impacts on the privacy and security of residents' data. Furthermore, although there is evidence suggesting that the integration of demographic data with other public services can enhance service quality, there remains a need to comprehensively understand the technical and logistical challenges involved in this integration. The relationship between policies and regulations and the effectiveness of population administration also requires further research, especially in the context of developing countries that may face various unique challenges. Public participation and community awareness are another important topic that is interconnected with the success of digitalization; however, research on the most effective strategies to enhance this participation is still limited. Addressing this gap in the future will require a holistic research approach that not only focuses on technical aspects but also considers the social, policy, and economic factors that influence population administration.
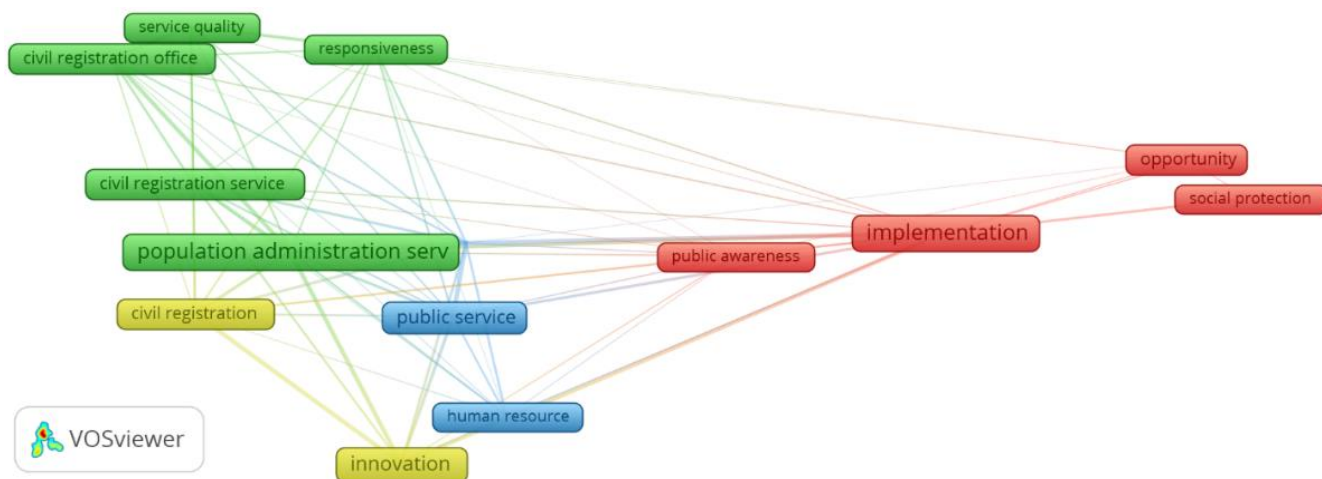

Figure 4. The relationship between research topics

3.2.1 Distribution of article citations

Table 2 below outlines the distribution of the most citations on the Scopus database:

Table 2. Number of article citations

Document Title (Year)	Cited
Teotihuacán regional population administration in Eastern Morelos (1977)	[22]
Competent Cultural Telebehavioral Healthcare to Rural Diverse Populations: Administration, Evaluation, and Financing (2019)	[11]
Testing the Population Administration Website Application Using the Black Box Testing Boundary Value Analysis Method (2020)	[5]
Names' survey in the population administration: State of Israel (1981)	[4]
The Thombo Treasure. Colonial Population Administration as Source for the Historical Demography of Early Modern Sri Lanka (2020)	[3]
Determining Business Process Improvement Priorities at Surabaya City Office for Population Administration & Civil Registration (2022)	[2]

Source: Scopus Data, 2024

Table 2 displays several articles related to population administration, along with the number of citations they have received. The oldest article, "Teotihuacán regional population administration in Eastern Morelos (1977) ", with 22 citations [20], shows that older research still holds relevance and continues to be used as a reference in subsequent studies. This article is likely to provide an important foundation for understanding the history of population administration in a particular region, which remains relevant for contemporary studies, both in historical context and in comparison with modern practices. The number of citations can also indicate the quality and influence of the article in this field of study, making it a frequently used reference by other researchers.

Another article that has received significant attention is "Competent Cultural Telebehavioral Healthcare to Rural Diverse Populations: Administration, Evaluation, and Financing (2019)", with 11 citations. This article indicates a high interest in modern approaches to population administration, particularly those that combine behavioral health technology with administration [16]. This reflects the current trend in population administration research, where technology and service innovation are the main focus. This article may respond to the increasing need for accessible healthcare services for diverse populations in rural areas, while also addressing the administrative challenges associated with effectively and inclusively implementing those services.

Meanwhile, recent articles such as "Testing the Population Administration Website Application Using the Black Box Testing Boundary Value Analysis Method [17]" and "Determining Business Process Improvement Priorities at Surabaya City Office for Population Administration & Civil Registration (2022)" still have a low citation count, with 5 and 2 citations respectively [12]. This may be due to several factors, such as the relatively recent publication date or a narrower focus on local or technical contexts that have not yet been widely referenced on a larger scale. However, these articles remain important because they illustrate how technological innovations and business process evaluations in population administration are being developed and implemented. Although the number of citations is still low, their contribution to understanding how technology can be used to enhance the efficiency and effectiveness of population administration remains significant, especially in local contexts such as what is happening in Surabaya [11].

3.2.2 Relationship between research topics

The description in Figure 5 below illustrates the relationship between the research topics.
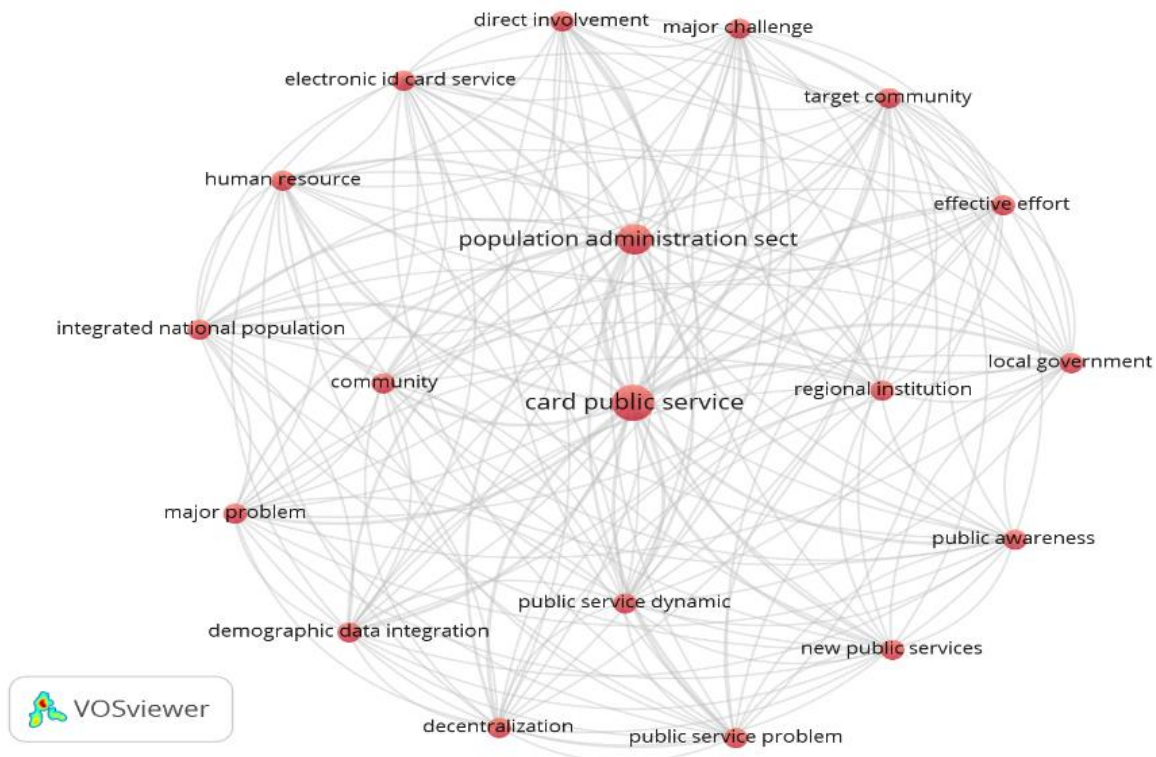

Figure 5. Interconnected research topics

Figure 5 illustrates the division of population administration research into several main clusters that show the focus and interconnections between specific topics. The green cluster, which focuses on topics such as *"civil registration office," "service quality," and "responsiveness,"* indicates that there is significant attention being paid to improving the quality of civil registration services [6]. Research in this cluster is likely aimed at identifying ways to enhance the responsiveness and quality of services provided by civil registration offices. This can include the development of more efficient procedures, better employee training, and the implementation of technology to expedite administrative processes [23]. This cluster shows that the quality of population administration services depends not only on policies but also on the daily implementation of services that directly interact with the community.

The red cluster, which focuses on *"implementation," highlights the importance of implementation strategies in population administration.* This topic is connected to "public awareness," *"opportunity," and "social protection,"* indicating that research in this cluster tends to explore how population administration policies can be implemented in a way that enhances public awareness and provides broader social benefits [24]. Increasing public awareness is crucial to ensure that society understands and utilizes the available services, while social protection highlights the expected impacts of these policies, such as better access to social rights and basic services [4]. Research in this cluster may also include case studies on the successes and challenges in the implementation of population administration programs in various regions, as well as analyses of how these programs can be replicated or improved.

The blue and yellow clusters, each focusing on *"public service" and "innovation,"* highlight the importance of innovation in civil registration and public services [10]. The blue cluster includes topics such as *"human resource,"* indicating that human resource management is a key element in providing effective and efficient public services in population administration [16]. The improvement of the quality and competence of human resources, through training and professional development, can directly contribute to the overall enhancement of population administration performance. Meanwhile, the yellow cluster emphasizes innovation in civil registration, which may include the development of new technologies or more efficient methods for managing population data. This innovation aims not only to improve administrative processes but also to create a system that is more responsive to the needs of the community and capable of adapting to changes in population dynamics [3]. The combination of innovation and strong human resource management indicates that the success of population administration heavily relies on the ability to continuously innovate and manage resources effectively [24].

Figure 5 illustrates the interconnected research topics that can influence the development of future research, namely: population administration sector, public service card, community, decentralization, demographic data integration, direct involvement, effective effort, electronic ID card service, human resources, integrated national population, local government, major challenges, major problems, new public service, population administration, public awareness, public service dynamics, public service issues, regional institutions, and target communities.

Innovation in population administration has become an increasingly important research topic, especially about efforts to improve the efficiency of public services. The network map produced by VOSviewer shows that topics such as "Population Administration Sect" and "Card Public Service" are at the center of many discussions, indicating the importance of the role of administration and identity card-based services, such as e-KTP, in the development of a modern population system [13]. These topics are closely related to concepts such as "Local Government" and "Regional Institution," which indicate that local governments and regional institutions are key actors in the implementation of this innovation [9]. In addition, the integration of demographic data and decentralization has emerged as important elements, reflecting efforts to enhance cohesion and interoperability within the population administration system, which ultimately aims to improve public services as a whole [17].

However, this map also reveals various challenges that are still faced, as reflected in the topics "Major Problem," "Public Service Problem," and "Major Challenge." This indicates significant barriers in the innovation process, which may include issues related to technology implementation [18], service sustainability, as well as adequate community involvement. Nevertheless, there is also a focus on effective efforts and the creation of new public services, as demonstrated by "Effective Effort" and "New Public Services" [19]. These innovations, which often involve new technologies such as electronic identity card services, demonstrate a strong drive to improve the quality of population administration through a more modern and integrated approach. Community involvement and public awareness are also considered important, emphasizing that the success of this innovation heavily relies on the active participation of the community and adequate human resources in its implementation [25].

3.4 Response regarding the theme/taken topic

The theme addressed in this research, namely population administration, is a topic that is very relevant and important in the modern context, especially in countries with large populations like Indonesia. Population administration encompasses various aspects, ranging from the management of population data, and the application of information technology in public services, to strategies to ensure that every citizen has fair and efficient access to government services. This topic is not only important for administrative efficiency but also social justice and inclusion. In today's digital era, innovations in population administration, such as the implementation of e-ID systems and the digitization of other public services, have become crucial in addressing existing challenges, including data inaccuracies, identity duplication, and the government's inability to reach populations in remote areas.

The relationship between this theme and government programs is very close, especially with the various initiatives that the Indonesian government has undertaken in recent years. One of the main programs that is highly relevant is the Electronic Identity Card (e-KTP) program, which aims to create a more accurate and integrated national identity system. This program is designed to facilitate various public services, such as health, education, and social welfare, by using a single identity that is nationally recognized. In addition, this program also serves as an important tool for improving the quality of demographic data, which in turn will enhance the efficiency of

public policy and development planning. The implementation of the e-ID card also helps minimize errors and fraud in population administration, which was a major issue before the existence of this system.

In addition to the e-ID card, the government has also launched various other programs aimed at strengthening population administration, such as the Population Administration Information System (SIAK), and improving services through technological innovations, such as mobile applications for population registration. These programs are designed to provide easier and faster access for the community in managing their population documents, while also improving the accuracy and security of the data collected. With better data integration and more efficient administrative systems, the government is expected to respond to the needs of the community more effectively, as well as support various development initiatives based on accurate data. The theme of this research, therefore, is highly relevant to the government's efforts to continuously improve the quality of public services and ensure that all citizens receive fair benefits from those services.

4. CONCLUSIONS

Based on the analysis of data covering five main aspects— the distribution of articles per year, publication trends based on country affiliation, publication trends based on institutional affiliation, the number of citations per article, and the relationship between research topics—several conclusions can be drawn. First, the distribution of articles per year shows fluctuations in research activity, with a peak in publications occurring in 2019. This shows that although there is a surge of interest in the topic of population administration at certain times, the sustainability of research may be influenced by various factors, such as changes in research priorities or challenges in policy implementation. Secondly, publication trends based on country affiliation indicate that Indonesia leads in the number of publications, suggesting that this topic is highly relevant in the country, possibly due to specific challenges faced in managing population data.

Furthermore, the publication trends based on institutional affiliation show that the Sepuluh Nopember Institute of Technology (ITS) is the main contributor, indicating a strong research focus at this institution. Other institutions, both national and international, contribute with a lower number of publications, indicating that this topic is still dominated by a few specific institutions. The number of citations per article also varies, with older articles tending to have higher citations, indicating the ongoing relevance of that research over the long term. This can also reflect the quality or impact of research that is more significant from some articles, even though newer articles may still need time to gain wider recognition.

Finally, the relationship between the research topics shows a strong connection between various aspects of population administration, such as technological innovation, public services, and policy implementation. This relationship map reveals that success in population administration relies not only on technological innovation but also on effective implementation strategies and the involvement of various stakeholders. This overall analysis shows that although there has been significant progress in population administration research, challenges remain in terms of sustainability and the equitable dissemination of research across various institutions

and countries. Researchers and policymakers need to continue strengthening collaboration and innovation to address these challenges and maximize the positive impact of research in this field.

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