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Novianto, a highly motivated professional with a passion for research, holds a Master's degree in Public Administration from Gadjah Mada University (UGM). Specializing in Public Policy, E-Government, and Data Analysis, he has developed a profound understanding of these fields. Currently serving as a Data and Information Analyst at the Provincial Government of North Kalimantan, Novianto utilizes his expertise in data analysis to provide valuable insights for decision-making. With a genuine curiosity and a commitment to knowledge advancement, he aspires to become a dedicated researcher in public administration. Armed with strong analytical skills and a drive for professional growth, Novianto aims to undertake research projects addressing critical public policy issues and contributing to evidence-based decision-making.

Systematic Literature Review:

Models of digital transformation in the public sector

Abstract

Today's technological advances affect businesses and society, including the government. The success or failure of implementation is due to the ambiguity of the strategies used and the limited knowledge of the factors that influence them. Although some previous studies exist, their generalizability is limited. The purpose of this study is to provide a model from the existing literature to develop a strategy for successful digital transformation. This study utilized a systematic literature review and content analysis methodology. Scopus database was used to identify relevant articles using a search string and inclusion/exclusion criteria. Content analysis identified a model related to the research topic. The findings provide valuable insights and a model for future research and practical applications. The result is a model for implementing digital transformation in the public sector, which is divided into four elements: external, organizational, citizen, and technology. By using a more comprehensive approach, the resulting model should be better able to generalize. The elements and their sub-elements of the model will be a recommendation for managers at different levels to design strategies for managing digital transformation. Further research can explore quantitative methods to test the model and the generalizability of the results of this study.

Keywords:

Digital Transformation; Public Sector; Systematic Literature Review; Content Analysis; Model

Introduction

The technological convergence that has occurred over the last 20 years, coupled with the explosion of global data traffic, online users, connected objects, and access to cloud computing have laid the foundation for the digital age that will bring outstanding

value to society (Oord et al., 2019). The organization also takes the initiative to explore digital technologies to benefit from transforming key business operations such as production, organizational structure, and business management. This dynamic has always led to the concept of Digital Transformation.

According to Chaffey (2015), digital transformation is a significant change in an organization's business processes, structure, and system implementation to enhance performance by utilizing digital media and technological platforms. Not only private sector organizations digital technology has significantly changed the routine of public administration and government, as well as the work environment of public services (Wirtz et al., 2020; Galperin et al., 2013). There are several benefits of digital transformation in the public sector. First, it can speed up policy-making processes and the quality of public services and create a collaborative government (Todisco et al., 2021). Second, creating good governance, creating public value, and improving government performance (Sabani, Farah, et al., 2019; Al-Hujran et al., 2015). Third, improve access and delivery of government information and services to citizens, business partners, employees, other agencies, and other government entities (Layne & Lee, 2001).

In the implementation of digital transformation in the public sector, there have been successes and failures. Examples of successful countries are Australia, Denmark, and the Republic of Korea, which are consistently ranked among the world's top pioneers in terms of innovation, transparency, and the use of public sector technologies, such as the EGDI UNDESA, World Bank Ease of Doing Business, and Transparency International's Perceived Cooperation Index (Nielsen, 2019; Meyerhoff Nielsen & Jordanoski, 2020). Estonia and Taiwan are also assessed as having been successful in fighting the COVID-19 pandemic using digital technology (Makarychev & Wishnick, 2022). On the other hand, some countries, such as Norway, have experienced failures in digital transformation projects accompanied by ineffective bureaucratic practices in updating driving licenses (SIMs) for professional heavy-duty truck drivers and drivers aged 80 and over (Hafseld et al., 2021). The automation of the child benefit program in

Norway creates a gap in the quality of services (Larsson, 2021). In Indonesia, the performance of e-government is also assessed as unsatisfactory by the public due to the poor availability and quality of information, and e-government services are unreliable and have information security vulnerabilities (Sabani, Deng, et al., 2019). This shows that the success of the digital transformation is largely influenced by how clearly the strategy is prepared (Venkateswaran & Jyotishi, 2018; Kane et al., 2015; Alharbi, 2019). In addition, the limitations of knowledge about supporting factors can affect the success of digital transformation (Rusu & Jonathan, 2017; Gil-García & Pardo, 2005). Aichholzer & Schmutzner (2000) also argued that leaders in the public sector have not yet recognized the organizational change necessary to realize the value of digital transformation.

There have been several previous studies trying to identify factors that influence the digital transformation of the public sector. First, Jonathan (2020) stated that the success of the digital transformation of the public sector is influenced by three factors: organizational and managerial, information technology, and the environment. However, there are weaknesses in the study related to the chosen research strategy and data collection methods that result in the limitation of the ability to generalize these findings, and it is recommended to conduct related research using different methods and settings. Second, research by Jonathan et al. (2021) stated that the factors affecting digital transformation in the public sector can be categorized into two categories: organizational factors and external factors. organizational factors consisting of information technology strategy, organizational structure, work culture, and information security, while the external factor consists of a lack of skilled human resources and inter-agency relationships. The study also suggests conducting quantitative research to test the generalizability of these

research findings. Third, research by Hajishirzi et al., (2022) found that organizations tend to focus on four things when implementing and adopting digital transformation, namely: organizations, technology, people, and external pressures. The research also suggests conducting research on the drivers of digital transformation in organizations and the importance of digital transformation for sustainable business models. After learning from the experiences of different countries about failures in carrying out digital transformation, this research is conducted to identify various factors that contribute to success in various public sector organizations. The researchers filled the research gap by providing models from existing literature to formulate strategies for successful digital transformation to ensure comprehensiveness, enhance validity and generalizability, address limitations, and provide a more robust and nuanced analysis of the topic. In addition, the study contributes to the existing literature by providing a comprehensive model for successful digital transformation in the public sector. It fills the gap by offering insights into the factors that influence implementation strategies, addressing the limited generalizability of previous studies.

To achieve this goal, a bibliographic analysis using a Systematic Literature Review because it can conduct comprehensive mapping and analysis of the literature. This method was chosen because the topic of digital transformation in the public sector has been widely studied by contemporary academics and practitioners before. This can be seen in Google Trends which shows this topic has experienced rapid growth from level 1 to 100 in the nine years between 2013 and 2022 (Hanelt et al., 2021). The importance of a systematic literature review involves ascertaining the body of knowledge using trend analysis of existing research and facilitating the development of new knowledge for a particular field by attempting to provide main insights in the form of evaluating research productivity and impact, integrated

knowledge mapping (e.g., antecedents, decisions, outcomes, theories, contexts, methods) and/or disclosing key themes or research streams in that field (Lim et al., 2022).

The rest of the article is structured as follows. First, a brief review of the existing literature on digital transformation in the public sector. Second, the research strategy, as well as the data collection and analysis methods, are described. The following section discusses the results and analysis of the research. Finally, the last section presents conclusions, limitations of the study, and future research directions.

Methods

The study uses two methods to produce a more comprehensive analysis: a systematic literature review with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta analyses) and content analysis. According to (Webster & Watson, 2002), in (Rusu & Jonathan, 2017), systematic literature reviews contribute to the advancement of knowledge in a field of study by helping the development of theory and less studied areas. This literature review is intended to contribute to digital transformation research in the public sector in three ways. First, provide an overview of digital transformation research activities in the public sector. Second, formulate and analyse studies in such a way that the influencing factors are known. This will make it easier for other researchers to identify research that is relevant to the field of research they are interested in. Third, it provides a systematic review of research libraries that helps point out problems that have been explored while revealing areas that are less attractive to researchers. Content analysis is defined as a research method for interpreting content through the process of systematic classification and the identification of themes or patterns (Hsieh & Shannon, 2005). The process of systematic literature study using PRISMA begins with the determination of research protocols, search criteria,

search source information, and literature selection. The results will then be analysed to identify the factors that influence digital transformation in the public sector.

The selection of literature in this study uses the right search strategy, using databases from Scopus. The Scopus Database is one of the most comprehensive sources for many purposes (Zhu & Liu, 2020). Search string or keyword series as an article search tool used to identify keywords related to the public sector digital transformation topic (Cao et al., 2021). First, identify and classify public sector digital transformation keywords into two groups: digital transformation and public. Second, searching for synonyms and relevant keywords for digital transformation, researchers found 14 keywords frequently used to refer to digital transformation. Third, searching for synonyms and relevant keywords of the public sector, and found 6 keywords frequently used to refer to the public sector. The final terms that were used are shown in Table 1 below. The combination of terms was searched for in the title, abstract, and keywords. The search term used is: [(“digital transformation” OR “digitization” OR “digitalization” OR “digital transform” OR “digital switch-over” OR “digitization” OR “advantages automation” OR “digitalization advantages” OR “digitization” OR “digitalization” OR “digitizing” OR “computerization” OR “digitized” OR “digitize” OR “automatization”) AND (“public sector” OR “public organization” OR “public organization” OR “governance” OR “government” OR “governmental”)].

The use of multiple words as keywords in the study serve to capture a comprehensive range of relevant concepts and ensure a thorough search of the literature. While some of these words may have similar meanings or can be used interchangeably, including them as keywords allow the researchers to cover different perspectives, and variations in terminology, and potentially identify different sets of articles that focus on specific aspects of the topic. By using a diverse set of keywords, the study aims to cast a wide net and capture a broader spectrum of literature related to digital transformation in the public sector. This approach helps to ensure that relevant articles are not missed and provides a more comprehensive understanding of the factors influencing digital transformation.

This stage produced 5,587 articles from 1963 to 2022 that match the previously defined search string. This stage of the search is still raw, so to find the relevant articles that match the research objectives and discuss in detail the digital transformation of the public sector, screening was carried out by determining the inclusion and exclusion criteria.

Furthermore, there are several criteria for inclusion and exclusion (Table.2). First, only English articles are included in this study because it is an international official language and there are limitations for researchers to use other languages. Second, only social sciences are included even though there are intersections with other fields of science such as computer science, economics, etc. Third, the type of publication

Table 1.
Search Terms and Keywords

“Digital transformation” OR		“Public sector” OR	
“digitization”, “digitalization”, “digital transform”, “digital switch-over”, “digitization advantages”, “automation”, “digitalization advantages”, “digitisation”, “digitalisation”, “digitizing”, “computerization”, “digitized”, “digitize”, “automatization”	AND	“public organization” “public organisation” “governance” “government” “governmental”	

Source: obtained from primary data

uses only journal articles because it has passed the review process before being published so that its quality can be accounted for. Fourth, only articles with full text (final) are included. Fifth, the type of article used in this literature review is an empirical study due to the completeness of the data. Sixth, to get maximum results, researchers only choose digital transformation that occurs in the public sector.

Table 2.
Criteria For Inclusion and Exclusion

Criteria	Filters
Restriction	Topic (Title, abstract, Keywords)
Language	English
Subject Area	Social Sciences
Documents type	Articles
Publication Stage	Final
Type of Article	Empirical Study
Digital Transformation	Public Sector

Source: obtained from primary data

Using a search string that applied the previously established inclusion and exclusion criteria, 531 articles from 1988 to 2022 were identified. The PRISMA flow diagram starts from the initial step with 531 articles to complete the research objectives selected by reading the abstract and then the full text to find out the content. The number of journal articles that meet the inclusion criteria is to be analysed with 151 articles and to be subjected to content analysis to determine the factors that influence the digital transformation of the public sector.

Results and Discussion

To identify the development of the literature, it is necessary to analyse the research trends on the implementation of digital transformation in the public sector. First, the contributing researchers based on the number of documents and their country of origin. Second, Contribution by the author and the sources/journals that discuss this research topic. Third, influential articles are based on the number of citations.

a. Occurrence by year of publication

The results show that the number of publications has increased significantly from 2018-2021. The highest number of publications also occurred in 2021. Then, the 151 articles found will be categorized based on their ranking Q1-Q4, because in the inclusion and exclusion process, only journals with this ranking are used, this relates to the quality of the article. The results are still dominated by articles ranked Q1 with 63 articles, Q2 with 50 articles, Q3 with 28 articles, and Q4 with 10 articles. Based on the number of articles based on the journal sources used, there are 99 different journals with a total of 151 articles. The journals most widely used to review and answer research questions are Sustainability (Switzerland) journals with a Q1 ranking of 16 articles followed by Government Information Quarterly with a Q1 ranking of 7 articles.

b. Contribution by the author

Furthermore, identify the author's contribution to developing this topic/issue. The author with the highest number of articles is Cathrine Edelhard Tomte who is a professor from the Department of Information Systems, University of Agder, Norway. she has two articles that discuss digitization in the education system which focus on how the Massive Open Online Courses (MOOCs) model of Scandinavian countries and how internal and external processes of digital transformation affect teaching and learning in higher education institutions. the journal article with the most citations published by the International Journal of Information Management. This article analyses privacy issues in implementing Health digitization with the Covid-19 contact tracing application with research locations in France.

Furthermore, all authors identified can be classified based on their country and continent of origin. There are 59 countries of origin divided into 6 continents. The United Kingdom became the country with the highest number of 20

authors, followed by Germany with 14 authors and India with 10 authors. Meanwhile, based on the continent of origin, authors from the European continent dominate with 61.08%, the Asian continent with 23.65%, the North American continent with 5.42%, the African continent with 3.94%, and the Australian and South American continents have the smallest with 2.96%.

c. Articles by citation number

The journal article with the most citations (77 citations) is from the International Journal of Information Management in 2020 written by Rowe F. about how data privacy issues in the implementation of Health digitalization with the Covid-19 contact tracing application with research locations in France. Furthermore, the study with the second highest number of citations used in this study is from the journal Public Money and Management in 2020 written by Agostino D., Arnaboldi M., and Lema M.D. with 51 citations. This article discusses how Covid-19 accelerates the digital transformation process in Museums with research locations in Italy. Then, the article with the third most citations came from the Comunicar journal in 2019 written by Engen B.K. on How the culture of ICT use with digital competence of teachers in schools as a driver of successful implementation of digitalization of education in schools with research locations in Norway. In fourth place is an article from the NJAS - Wageningen Journal of Life Sciences journal in 2019 written by Fielke S.J., Garrard R., Jakku E., Fleming A., Wiseman L., Taylor B.M. with 45 citations that discuss how the policy framework relating to agricultural technology and its future with research locations in Australia. The journal article with the fifth most citations was published in Quality in Higher Education in 2019 written by Tomte C.E., Fosslund T., Aamodt P.O., and Degn L. with 44 citations discussing how internal and external processes of digital transformation affect teaching and learning in higher education

institutions with research locations in Norway and Denmark. The findings show that the fields of Health, Education, and Agriculture are interesting topics/issues in the process of implementing digital transformation in the public sector, especially with the conditions of the Covid-19 pandemic.

d. Data synthesis and Qualitative analysis

1) Thematic map analysis

The thematic map analysis of the implementation of public sector digital transformation aims to gain insight into the current state and what the future topics are. This analysis is useful in providing knowledge to researchers and stakeholders regarding the future potential of thematic field research development in a field. To identify the body of knowledge for the implementation of digital transformation in the public sector. The authors conducted a thematic map analysis by taking groups of the authors' keywords and interconnecting them to obtain themes. These themes are identified by properties (density and centrality). Density is represented in the vertical axis, while centrality takes the horizontal axis. Centrality is the degree of correlation between different topics; density measures the compactness between nodes (Esfahani et al., 2019). These two properties measure whether a particular topic is well-developed, important, or not. The higher the number of relations a node has with others in the thematic network, the higher the centrality and importance, and it lies within the position of importance in the network. Similarly, the cohesiveness between nodes, representing the density of a study, illustrates its ability to develop and sustain itself. Figure. 1, describes a thematic map divided into four quadrants (Q1 to Q4) the upper right quadrant (Q1) represents the motor theme, the lower right quadrant (Q4) is the basic theme, the upper left quadrant (Q2) is the highly specialized theme (niche theme), and the lower

left quadrant (Q3) is the emerging or declining theme.

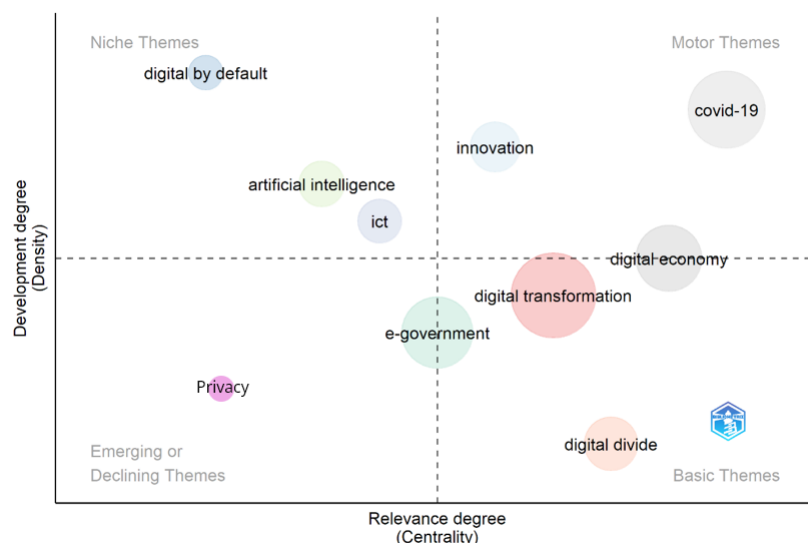
Based on the findings, themes such as "digital economy" and "digital transformation" are between Q1 and Q4, meaning that these themes are well developed and can build this research field. Meanwhile, themes in Q1 such as "innovation", and "Covid-19" are the main themes. The themes in Q4 such as the "digital divide" are very important as the basis for the development of this topic. These Q2 themes have internal ties but have a marginal contribution to development. The findings show themes in Q2 such as "digital by default", "artificial intelligence", and "ICT" are potential topics connected to digital transformation. Then the theme "e-government" was found between Q3 and Q4, indicating that the theme has decreased and will shift to become a basic theme. The theme in Q3, "privacy" is a newly emerging theme due to the implementation of many digital transformations involving public data such as health digitization, Electronic Identification Card, and education digitization which requires community or public data. So that the theme of privacy is a theme that will develop

and possibly become the main theme in the future. This is also shown by the journal article with the most citations written by Rowe F. about how data privacy issues in the implementation of health digitization with the Covid-19 contact tracing application.

2) Literature cluster analysis

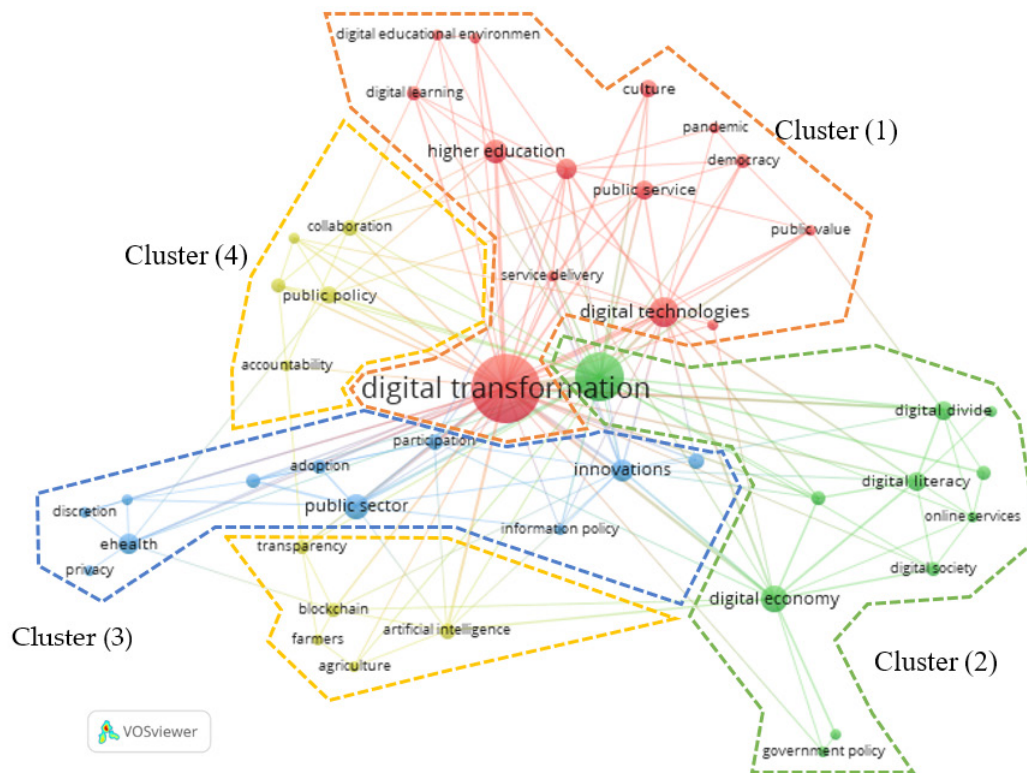
The following analysis is literature clustering based on the most used keywords in this research topic. This keyword and co-occurrences analysis uses author keywords. The results of co-occurrence analysis based on keywords in VOS viewer produce a visual map containing 45 top words from 568 existing keywords and produce 4 clusters (Figure 2). Clusters are groups of frequently used keywords in journal articles that are interconnected and have a high correlation with each other. The first cluster contains all words that describe the external pressures of the organization such as economic, social, governmental, political, or those based on regulations, rules, and conditions. The second cluster refers to various components of the organization, such as models, digital capabilities,

Figure 1.
Thematic Map of Topics for Implementing Digital Transformation in the Public Sector



Source: obtained from primary data

Figure 2.
Literature Clustering based on author keywords



Source: obtained from primary data

Table 1.
Clusterization results

Cluster 1	Cluster 2	Cluster 3	Cluster 4
Covid-19	digital competence	adoption	accountability
culture	digital divide	change management	agriculture
democracy	digital economy	discretion	artificial intelligence
digital educational environment	digital literacy	ehealth	blockchain
digital learning	digital society	industry 4.0	collaboration
digital technologies	e-government	information policy	coordination
digital transformation	government policy	innovations	farmers
economic growth	information and communication technologies	participation	public policy
higher education online learning	information society	privacy	transparency
pandemic	local government	public sector	trust
public service	online services	street-level bureaucracy	
public value			
service delivery			

Source: obtained from primary data

digital literacy, and competitive advantage. The third cluster contains all types that relate to people/society such as participation, interaction, discretion, and privacy. The fourth cluster refers to technologies such as AI, blockchain, transparency,

and accountability. The clustering results are in line with previous research findings related to the four main elements often studied in digital transformation in the public sector (Hajishirzi et al., 2022).

3) Content/substance analysis

After analysing the development and clustering of research on implementing digital transformation in the public sector. Next is the content or substance analysis of all research articles found. This analysis answers research questions regarding what factors influence the implementation of digital transformation in

the public sector and as a basis for building an implementable model.

After analysing the content to find the factors affecting digital transformation in the public sector, it is then grouped based on the clustering results to create a model consisting of several main elements such as external elements, organizational elements, citizen elements, and

Table 2.
Factors influencing digital transformation in the public sector

Factors influencing	Source
Funding/Capital	(Collingridge & Margetts, 1994), (Hoey, 1998), (Soni et al., 2017), (Eckhardt et al., 2018), (Balogun & Adjei, 2019), (Mitra & Banerjee, 2019), (Lappi et al., 2019), (McBride, 2019), (Zhang et al., 2020), (Henderson, 2020), (Gladkova & Ragnedda, 2020), (Tømte et al., 2020), (Agostino et al., 2020), (Christensen & Lægheid, 2022), (Onyango & Ondiek, 2021), (A. V. Volkova & Kulakova, 2021), (M. N. Roy, 2021), (Kireyeva et al., 2022), (Osabwa, 2022), (H. T. Nguyen et al., 2022), (Endrodi-Kovács & Stukovszky, 2022)
Legislative/Political Support	(Mohi & Roberts, 2009), (J. Roy, 2017), (Nielsen, 2017), (Tømte et al., 2019), (Lappi et al., 2019), (J. P. Roy, 2019), (Kotsev et al., 2020), (Špaček et al., 2020), (F. Aritenang et al., 2021), (Pulignano & Lancker, 2021), (Farhangi & Alipour, 2021), (Chung et al., 2022), (Mikhaylova, 2022)
Regulatory/Legal Framework	(Vilkov & Tian, 2019), (Balogun & Adjei, 2019), (Menshikov & Volkova, 2019), (Pecheranskyi & Revenko, 2019), (Schedler et al., 2019), (Lappi et al., 2019), (Ali, 2020), (Kotsev et al., 2020), (Špaček et al., 2020), (Guss, 2020), (Brdesee, 2021), (Kharitonova & Sannikova, 2021), (Aminah & Saksono, 2021), (Garske et al., 2021), (A. V. Volkova & Kulakova, 2021), (Salakhova et al., 2021), (Xue et al., 2022), (Mikhaylova, 2022), (H. T. Nguyen et al., 2022), (M. Chen & Grossklags, 2022)
force majeure	(Agostino et al., 2020), (Fouillet et al., 2021), (Aasback & Røkkum, 2021)
Governance/ Managerial system transformation	(Collingridge & Margetts, 1994), (Mergel, 2019), (Tømte et al., 2019), (Menshikov & Volkova, 2019), (Di Giulio & Vecchi, 2019), (Alahakoon, 2020), (Kotsev et al., 2020), (Tømte et al., 2020), (Špaček et al., 2020), (Seo & Myeong, 2020), (Bogumil-Uçan & Klenk, 2021), (Håkansta, 2022),
Organization Culture	(Hoey, 1998), (Miller & Tucker, 2011), (Giest & Raaphorst, 2018), (Menshikov & Volkova, 2019), (J. P. Roy, 2019), (Aminah & Saksono, 2021), (Onyango & Ondiek, 2021), (Zhao et al., 2021), (Christensen & Lægheid, 2022)
HR Development	(Mohi & Roberts, 2009), (Lemmens et al., 2017), (Balogun & Adjei, 2019), (Pecheranskyi & Revenko, 2019), (Trusova, 2019), (Schedler et al., 2019), (Mitra & Banerjee, 2019), (Nicholls, 2019), (Di Giulio & Vecchi, 2019), (McBride, 2019), (Engen, 2019), (Rodriguez-Heví et al., 2020), (Zhang et al., 2020), (Henderson, 2020), (Mahrenbach & Mayer, 2020), (Agostino et al., 2020), (Špaček et al., 2020), (Paul et al., 2020), (Pereira et al., 2020), (Solomon & van Klyton, 2020), (Hanninger et al., 2021), (Manny et al., 2021), (Abdullah et al., 2021), (Sembekov et al., 2021), (Luna & Breternitz, 2021), (Demchenko et al., 2021), (Aminah & Saksono, 2021), (Liu et al., 2021), (Onyango & Ondiek, 2021), (Djakona et al., 2021), (Giang et al., 2021), (A. V. Volkova & Kulakova, 2021), (M. N. Roy, 2021), (Kontogeorgis & Varotsis, 2021), (Masik et al., 2021), (Bhaskara & Bawa, 2021), (Vanderhorst et al., 2021), (H. T. Nguyen et al., 2022), (Collington, 2022), (Urs & Spoaller, 2022), (Christensen & Lægheid, 2022), (Endrodi-Kovács & Stukovszky, 2022)
Leadership	(Giest & Raaphorst, 2018), (Katigbak, 2019), (Rehouma et al., 2020), (Pittaway & Montazemi, 2020), (Špaček et al., 2020), (Laufer et al., 2021), (Aminah & Saksono, 2021), (Zakir Hossain, 2021), (M. N. Roy, 2021), (Callanan, 2021), (Chung et al., 2022), (Nugraha et al., 2022)
Vision and Strategy (Coordination, Collaboration, Promotion)	(Collingridge & Margetts, 1994), (Mohi & Roberts, 2009), (Scupola & Zanfei, 2016), (J. Roy, 2017), (Caswell et al., 2017), (Nielsen, 2017), (Laenens et al., 2018), (Eckhardt et al., 2018), (Tømte et al., 2019), (E. Volkova, 2019), (Pecheranskyi & Revenko, 2019), (Trusova, 2019), (Lappi et al., 2019), (Katigbak, 2019), (Henderson, 2020), (Laitsou et al., 2020), (Ali, 2020), (Tureby & Wagrell, 2020), (Špaček et al., 2020), (Zerrer & Sept, 2020), (Haase & Buus, 2020), (Manny et al., 2021), (Christie et al., 2021), (Bormann et al., 2021), (Laufer et al., 2021), (Unceta et al., 2021), (Garske et al., 2021), (Djakona et al., 2021), (Yoshida et al., 2021), (A. V. Volkova & Kulakova, 2021), (Callanan, 2021), (Bogumil-Uçan & Klenk, 2021), (Chung et al., 2022), (Tan & Lim, 2022), (Qian et al., 2022), (Martin-Shields et al., 2022), (Collington, 2022), (T. X. H. Nguyen et al., 2022), (Vasylytsiv et al., 2022), (Urs & Spoaller, 2022), (Zumofen et al., 2022), (Fleischer & Carstens, 2022), (Supari & Anton, 2022)

Factors influencing	Source
Participation and Empowerment	(Missingham, 2001), (Scupola & Zanfei, 2016), (Mattsson, 2016), (Caswell et al., 2017), (Nielsen, 2017), (Fielke et al., 2019), (Issabayeva et al., 2019), (J. P. Roy, 2019), (Rodriguez-Hevíá et al., 2020), (C. H. Chen et al., 2020), (Fyshchuk & Evsyukova, 2020), (Agostino et al., 2020), (Mir et al., 2020), (Zerrer & Sept, 2020), (Haase & Buus, 2020), (Menon et al., 2021), (Abdullah et al., 2021), (Pynnönen et al., 2021), (Ponomarenko et al., 2021), (Lageson et al., 2021), (Zakir Hossain, 2021), (Criado & Guevara-Gómez, 2021), (Callanan, 2021), (Kontogeorgis & Varotsis, 2021), (Bhaskara & Bawa, 2021), (Boland et al., 2022), (Tan & Lim, 2022), (T. X. H. Nguyen et al., 2022), (Vasylytsiv et al., 2022), (Zumofen et al., 2022), (Hettiarachchi et al., 2022), (Noor, 2022)
Skills and Digital Literacy	(Galperin et al., 2013), (Berger et al., 2016), (Palmeiro et al., 2019), (Rowe, 2020), (Ali, 2020), (C. H. Chen et al., 2020), (Špaček et al., 2020), (Zerrer & Sept, 2020), (Laufer et al., 2021), (Androniceanu & Georgescu, 2021), (Bokšová et al., 2021), (A. V. Volkova & Kulakova, 2021), (Bhaskara & Bawa, 2021), (Kireyeva et al., 2022), (Considine et al., 2022), (Mikhaylova, 2022), (Deineko et al., 2022), (T. X. H. Nguyen et al., 2022), (Zumofen et al., 2022), (M. Chen & Grossklags, 2022)
Socio-Demographics	(Çavlin Bozbeyoğlu, 2011), (Lamberti et al., 2014), (Menshikov & Volkova, 2019), (Sourbati & Loos, 2019), (Fouillet et al., 2021), (Pulignano & Lancker, 2021), (Pérez-Amaral et al., 2021), (Larsson, 2021), (Gupta & Sengupta, 2021), (Martin-Shields et al., 2022), (Vicente et al., 2022), (T. X. H. Nguyen et al., 2022), (Kovacs, 2022), (Kolli et al., 2022),
Data Security	(Çavlin Bozbeyoğlu, 2011), (Miller & Tucker, 2011), (Garrety et al., 2014), (Mattsson, 2016), (Menshikov & Volkova, 2019), (Pecheranskyi & Revenko, 2019), (Issabayeva et al., 2019), (Trusova, 2019), (Rowe, 2020), (Müller-Török et al., 2020), (Mahrenbach & Mayer, 2020), (Mir et al., 2020), (Haase & Buus, 2020), (Ejdys, 2020), (Pálmai et al., 2021), (Fouillet et al., 2021), (Yoon, 2021), (Kharitonova & Sannikova, 2021), (Demchenko et al., 2021), (Garske et al., 2021), (Commandré et al., 2021), (A. V. Volkova & Kulakova, 2021), (Kontogeorgis & Varotsis, 2021), (Makarychev & Wishnick, 2022), (M. Chen & Grossklags, 2022)
Infrastructure	(Collingridge & Margetts, 1994), (Soni et al., 2017), (Moses et al., 2018), (Tømte et al., 2019), (Schedler et al., 2019), (Zhang et al., 2020), (Tureby & Wagrell, 2020), (Špaček et al., 2020), (Paul et al., 2020), (Seo & Myeong, 2020), (Hanninger et al., 2021), (Bormann et al., 2021), (Sembekov et al., 2021), (Aminah & Saksono, 2021), (Liu et al., 2021), (Androniceanu & Georgescu, 2021), (M. N. Roy, 2021), (Kontogeorgis & Varotsis, 2021), (Bhaskara & Bawa, 2021), (Mikhaylova, 2022), (Deineko et al., 2022), (Martin-Shields et al., 2022), (Zumofen et al., 2022)
IT Architecture	(Ameripour et al., 2010), (Galperin et al., 2013), (Lappi et al., 2019), (Kotsev et al., 2020), (Haase & Buus, 2020), (Laufer et al., 2021), (Liu et al., 2021), (Androniceanu & Georgescu, 2021), (Ranerup & Henriksen, 2022), (Kolli et al., 2022)
Interoperability	(Menon et al., 2021), (Aminah & Saksono, 2021), (Fleischer & Carstens, 2022)

Source: obtained from primary data

technological elements. This model describes the elements of digital transformation in the public sector resulting in a systematic mapping study. In addition, the mapped elements synergize with each other because digital transformation requires various capabilities in each phase shown in Figure 3.

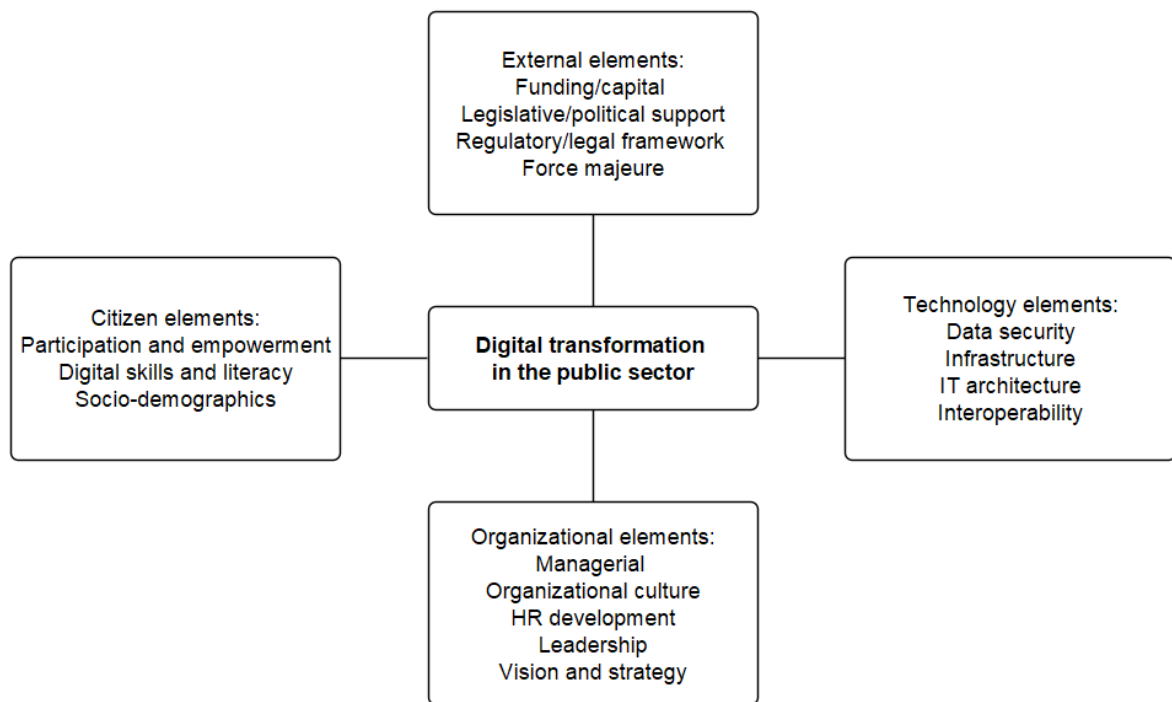
There are four main elements within which there are several sub-elements. These elements are formed based on empirical evidence from literature sources after content analysis, which are factors that influence digital transformation in the public sector. In addition, the sub-elements provide a broader picture of implementing digital transformation in the public sector. Therefore, the interpretations of the elements and their sub-elements will be a recommendation for managers

at various levels to design strategies for managing digital transformation and answer this research question.

a. External Elements

This element describes how pressures from external organizations in implementing digital transformation consist of funding/capital as in, legislative/political support, regulatory/legal framework, and force majeure. It is found from several digital transformation practices in various countries such as failure to utilise inappropriate funds on IT infrastructure and to overcome other barriers to policy development in India (Soni et al., 2017) (M. N. Roy, 2021), in South Korea, to create a sustainable digital transformation policy requires legislative support so that digital

Figure 3.
Digital transformation model in public sector



Source: obtained from primary data

transformation becomes a national agenda and continues despite a change in president (Chung et al., 2022), 2017) (M. N. Roy, 2021), in South Korea, to create a sustainable digital transformation policy, legislative support is needed so that digital transformation becomes a national agenda and continues despite a change of president (Chung et al., 2022), in the practice of digital transformation in educational organisations in Saudi Arabia, that without rules and regulations in the digitisation process will result in a large or more expensive use of resources (Brdesee, 2021), in the practice of museum digitisation in Italy also argues that Covid-19 as an accelerator for digital transformation in public service delivery (Agostino et al., 2020).

b. Organization Elements

This element consists of government/managerial system transformation, organizational culture, HR development, leadership, vision, and strategy (coordination, collaboration, promotion).

Based on the findings of the implementation of digital transformation in various countries such as the United Kingdom, the organizational structure used involves a third party to bridge the centralized central government and decentralized local governments and accelerate Digital Transformation (Mergel, 2019), in the United Kingdom it was found that there was no empirical evidence of a decrease in data loss cases with the use of encryption. On the contrary, there is a relationship between an increase in data loss cases with work cultures such as employee dishonesty and employee carelessness after the adoption of encryption software (Miller & Tucker, 2011), The digitalization of agriculture for human resource development for 15.000 farmers effectively require students from 400 local campuses, to provide content in local languages and maintain a good relationship with farmers by making content relevant, responding to questions, and displaying best practices to motivate farmers (Bhaskara & Bawa, 2021), the

capacity of leaders can hinder the implementation of public sector digital transformation such as apathy in terms of public engagement thus hindering resource mobilization at the local level (Zakir Hossain, 2021), The practice of agricultural digitalization in European countries, a very clear vision to promote sustainable agriculture through climate change and biodiversity targets and other environmental quality targets is easily translated into a legal framework to regulate fair access and safe use of technology (Garske et al., 2021). In addition, strategies also influence the digital transformation of the public sector such as coordination (Martin-Shields et al., 2022), collaboration (Mohi & Roberts, 2009), (J. Roy, 2017), (Caswell et al., 2017), (Eckhardt et al., 2018) and promotion (Yoshida et al., 2021), (A. V. Volkova & Kulakova, 2021), (Laenens et al., 2018).

c. Citizen Elements

This element describes how the relationship of digital transformation in the public sector with citizens or communities consisting of participation and empowerment, digital skills and literacy, and socio-demographics. based on the findings of the implementation of digital transformation in various countries such as the digitalization of border areas in Germany by empowering villagers to develop their ideas and with Bottom-up strategies to improve their quality of life. In addition, actors were identified in groups as drivers, supporters, and users. The interaction and collaboration of these groups created DSI (Digital Social Innovation) in rural areas (Zerrer & Sept 2020), digitization of the health sector (Contact Tracing App) in France required education of the public regarding the importance of privacy and the dangers of using personal identity in a health system. do not let ICT damage human identity, human rights, personal life and individual freedom (Rowe, 2020), socio-demographic conditions such as age, digital literacy level, region (Çavlin Bozbeyoğlu, 2011), education (Pérez-Amaral

et al., 2021), income (Larsson et al., 2011), and income (Larsson et al., 2021), 2021), income (Larsson, 2021) and gender (Gupta & Sengupta, 2021) influence the implementation of digital transformation in the public sector.

d. Technology Elements

This element describes how technology is managed in the process of digital transformation in the public sector, which consists of data security, infrastructure, information technology architecture, and interoperability. Based on findings in various countries such as the digitalization of the health sector in South Korea, although it is considered successful and very effective in handling Covid-19 after the pandemic ended, there was a dilemma related to data because the public did not get certainty about the use of the data for any purpose (Yoon, 2021), digitalization of the education sector in Nigeria shows that the level of digitalization is still low which is marked by inadequate hardware and software facilities when compared to the number of students (Moses et al., 2018), 2018), digitization of governance in Finland faces a dilemma, namely regulating and aligning individual organizational projects with national digitization so that information technology and data architecture arrangements/alignments are needed (Lappi et al., 2019), digitization of governance in Indonesia faces challenges, such as the lack of data integration (Aminah & Saksono, 2021). In addition, since 2017 the German government with the OZG (The German Online Access Act) requires the integration of services into one (Fleischer & Carstens, 2022).

Conclusion

The development of public sector digital transformation research shows an increase from year to year, with the highest number of publications in 2021 totalling 48 journal articles. Authors who contribute to this topic come from

59 countries, dominated by countries from the European continent. Moreover, what is interesting about the development of this topic literature is that the most cited document discusses data privacy issues implementation of health digitization with the Covid-19 contact tracing application (Rowe, 2020). The thematic map analysis using keywords shows that research related to innovation and Covid-19 is the motor theme. then, research related to privacy is a new theme (emerging) today. There are also research themes in basic categories such as the digital divide, and digital transformation. the clustering also found patterns in data processing and visualization. First, clusters of external organizational pressures are dominated by keywords such as economic, social, governmental, technological, and political or they can be based on regulations, rules, and conditions. Second, is the organizational cluster, with keywords such as model, digital capability, digital literacy, and competitive advantage. Third, the citizen/society cluster with keywords such as participation, interaction, discretion, and privacy. Fourth, the technology cluster with keywords such as Artificial Intelligence, blockchain, transparency, and accountability.

The results of learning from practices in various countries are the factors that influence digital transformation in the public sector. Then the factors are categorized into four main elements that become models for implementing digital transformation in the public sector. First, external elements consist of funding/capital, legislative/political support, regulatory/legal framework, and force majeure. Second, organizational elements consist of government/managerial system transformation, organizational culture, HR development, leadership, vision, and strategy (coordination, collaboration, promotion). Third, citizen elements consist of participation and empowerment, digital skills and literacy, and socio-demographics. Fourth, technology elements consist of data security, infrastructure, information technology architecture,

and interoperability. This research has several limitations that need to be acknowledged. First, using a single database as the source of literature may limit the representation of the entire body of literature on digital transformation in the public sector. Certain articles may have been excluded based on search criteria or limited access to full text. Each methodology employed in the study, such as systematic literature review and content analysis, has its own inherent limitations. The authors should discuss these limitations, including potential biases in article selection, subjectivity in coding and interpretation of content, and reliance on existing literature. The study relies on the availability and quality of the selected articles for analysis. It should be acknowledged that not all relevant data may be accessible or adequately reported in the literature. Incomplete or biased reporting, variations in research methodologies, or limitations in the quality of the included studies can affect the reliability and validity of the findings.

Future research can focus on explore quantitative methods to test the model and generalizability and conducting comparative studies across different countries or regions to examine the similarities and differences in digital transformation initiatives in the public sector. This can provide valuable insights into the contextual factors that influence successful digital transformation and help identify best practices. In addition, the model containing important components in digital transformation in the public sector can be used in formulating policy strategies for the government or organizers of digital transformation in the public sector while still paying attention to pre-existing local conditions/values.

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