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KNOWLEDGE MAPPING OF E-GOVERNMENT EMERGING TECHNOLOGIES IN ARAB REGION: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

In the Arab context, the adoption of e-government applications and services is increasingly receiving high attention. Many Arab countries are among the best in the world in the implementation and utilization of emerging technologies in different governmental bodies. In this review, a systematic literature review of e-government in the Arab region is conducted.

First, a metadata analysis of 660 articles from two databases, namely Scopus and Web of Science, using PRISMA is conducted to identify the current state of e-government in the region. Second, a bibliometric analysis of 52 documents using VOSviewer is conducted, determining the clusters, occurrences and relevance score. Third, a thematic analysis through Wordstat is used to identify the themes, word cloud and distribution of keywords. Fourth and last, a content analysis is carried out to summarize the potential development areas and challenges related to e-government in the Arab region.

The results indicate that Gulf countries, including the UAE, KSA, Qatar, and Oman, are at the top of the list in implementing e-government services and applications, while other countries face many difficulties and challenges.

This review offers insights for future work regarding e-government in the Arab region and globally.

KEYWORDS ARAB REGION (MENA), DIGITALIZATION, E-GOVERNMENT, KNOWLEDGE MAPPING, REVIEW



1. Introduction

E-Government, or electronic government, refers to the use of Information and Communication Technologies (ICTs) to enhance the efficiency, transparency, and citizen participation in government functions and procedures [1-3]. E-Government is also known as e-gov, electronic government, Internet governance, digital government, online government, and connected government [4]. Different organizations and countries may use these terms interchangeably or with slight variations in meaning. E-Government involves the application of ICTs, particularly the Internet, to support government operations and interactions with citizens, businesses, and other government agencies [5]. The primary objectives of e-Government include increasing efficiency and effectiveness in governmental tasks, improving public services, enhancing the use of information in decision-making processes, and improving communication among different governmental offices [6]. E-Government encompasses various types of digital interactions: Citizen-to-Government (C2G): Citizens interacting with their government; Government-to-Government (G2G): Interactions between different government agencies; Government-to-Citizen (G2C): Governments providing services directly to citizens; Government-to-Employee (G2E): Governments interacting with their employees and Government-to-Business (G2B): Governments interacting with businesses and commerce [7].

Furthermore, e-government delivery models include facilitating citizen involvement in governance using ICTs and business process re-engineering (BPR). This involves citizens communicating with all levels of government and facilitating their involvement in governance [8]. The implementation of e-Government has been a global effort, with various countries adopting different strategies and technologies. Through online portals and mobile applications, citizens can access government services such as applying for permits, paying taxes, and accessing public records from the convenience of their homes [8, 9]. E-government not only improves the efficiency of government operations but also enhances citizen engagement by providing greater transparency and accessibility to government processes. In addition, e-government initiatives help reduce bureaucratic red tape, streamline processes, and save costs for both governments and citizens [10, 11]. As technology continues to advance, the potential for e-government to revolutionize the way governments interact with their constituents is vast.

In Arab context, e-government has been steadily evolving over the past decade, with governments recognizing the need to harness digital technologies to enhance efficiency and improve service delivery [12, 13]. Many Arab countries have successfully implemented various e-government initiatives, such as online portals for government services, electronic payment systems, and digital platforms for citizen engagement [14, 15]. These efforts have not only streamlined administrative processes but also increased transparency and accountability within government institutions. However, challenges still exist, including limited internet



connectivity and digital literacy rates among certain segments of the population [16 - 19], [8]. Moving forward, Arab countries should continue investing in e-government infrastructure while prioritizing data security and privacy concerns to ensure that all citizens can benefit from the advantages of an increasingly digitized public sector.

We conducted this systematic literature review (SLR) to map knowledge in e-government based on the prior works concentrating on Arab region. Many of prior studies related to egovernment insights and implementation, opportunities and challenges and potential use and recent trends have been conducted in Arabic countries. In addition, we describe the current state of e-government in Arab region including the top works, affiliations, Arab countries conducted this research, subjects of research area and other bibliometric data. Furthermore, we aim to investigate the recent trends, potential use, opportunities and challenges of egovernment in Arab countries. This review will give a proper picture about e-governments in Arabic countries and assist scholars interested in the same field to draw a bigger picture regarding e-government and its applications in Arab region.

The rest of this systematic review is structured as follows; Section 2 presents the methodologies used in this SLR including metadata analysis, bibliometric analysis, content analysis and using of PRISMA. Section 3 provides analysis of selected literature by year, institution, subject, country. Section 4 provides bibliometric analysis of literature including word counts, contributions and keywords. Section 5 provides thematic analysis of e-government in Arab countries. Section 6 illustrates the challenges, potential use and opportunities of e-government in Arab region. Section 7 included a conclusion of SLR and sections 8 and 9 included the limitations, implications and future trends respectively.

2. Methodology

A systematic literature review rigorous and comprehensive method used to synthesize and analyze existing research studies on a particular topic [20]. SLR involves a structured and replicable process of identifying, selecting, appraising, and synthesizing relevant studies to provide a summary of the current evidence base [21]. We used SLR to map knowledge regarding e-government in Arab region by conducting four types of analysis including; descriptive analysis of existed literature related to e-government in Arab region, bibliometric analysis to reveal the current state and themes of e-government, thematic analysis to explore the most keywords related to e-government in Arab region; content analysis to summarize the current trends, opportunities and challenges of e-government in Arab region.





Fig. 1. Flowchart of SLR Analysis Approaches

In this SLR, the initial research was conducted in Scopus and Web of Science databases. Articles published between 2000 and 2024 were filtered prior studies in Scopus with the following inquiries:

(TITLE-ABS-KEY (e AND government) OR TITLE-ABS-KEY (electronic AND government) OR TITLE-ABS-KEY (digital AND government) AND TITLE-ABS-KEY (Arab) OR TITLE-ABS-KEY (Arabic))

The same keywords we used in the initial search in WoS database. Where we search for egovernment and the Arab. In total, we found 515 documents in Scopus and 1219 documents in the WOS databases. First, we removed the duplicated studies from both sources, where 715 (Scopus = 231, WoS = 486) documents were reserved to the next stage. Further filtering was carried out via including additional criteria, where publication stage is final and language is English or Arabic resulting in (n = 315) through initial screening. Next, a full-text screening process was carried out to ensure all retrieved articles were related to e-government in the Arab region. A total of 52 documents were finally reserved for meta-analysis, bibliometric analysis and content analysis.

2.1 Inclusion and Exclusion Criteria

We adopted PRISMA 2020 to select relevant prior studies on e-government in the Arab region [22]. PRISMA 2020 is an updated guideline for reporting systematic reviews and metaanalyses, designed to enhance transparency and consistency in the reporting of these studies [23]. With a focus on promoting collaboration and knowledge sharing, PRISMA 2020 serves as



a key platform for professionals to stay informed about the rapidly evolving landscape of information and prior works. The inclusion criteria incudes years between 2000 and 2024; final publication stage; all types of articles, conference paper, book chapter, review; journal, conference proceeding source of articles; and both English and Arabic languages. On the other hand, exclusion criteria include years before 2000; books, proceeding papers, notes were also excluded; inn addition to other journals not in Arabic and English. More importantly, after screening documents, many of papers were excluded if not related to the two keywords: e-government and Arabic region. Figure 2 illustrates these steps of inclusion and exclusion criteria.





3. Metadata Analysis

3.1 Documents by Year

As illustrated in figure 3, previous works in e-government in Arab region could be divided into three stages. The first stage starts from the year 2000 to the year 2010 where the volume of research on e-government in Arab region is under 20 articles per year. The second stage includes articles between 2011 and 2020, where the volume of publication increases from 20 at low level to 40 or little more at upper level. The third stage starts from 2021 to the 2024 where the volume of publication in e-government in Arab countries increases more than 60 articles per year. These information shows ascending curve in publication almost double in

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every ten years. These results are rational due to the high adoption of ICT and technology applications in government services. Many of the Arabic countries adopted online services and invested a huge amount of money in their e-services infrastructure, especially in the Gulf countries.



Fig. 3. Distribution of studies by year of publication

3.2 Documents by Source

The distribution of selected articles (52), based on the sources is shown in figure 4. It is important to mention that, the distribution of initial search article was varied, so we limited the source based on the final stage of selecting articles in this review. These sources are mostly related to government, information system and networks areas.



Fig. 4. Top 5 journals based on 52 articles



3.3 Documents by Affiliation

One of the most significant results of metadata analysis is to show the interest of Arab region in implementation of e-government services and applications. The results of initial search illustrate that 6 out of the top 10 universities that conducted research on e-government are from United Arab Emirates (UAE). In addition, Qatar university (Qatar), King Saud university (KSA), Yarmouk university (Jordan) and American university of Beirut (Lebanon) were the other 4 top affiliations among the top 10. This result reflects that UAE is the best country in adoption of e-government. In addition, Sultan Qaboos university was the 11th in the list with 8 articles showing that Oman is also among the 6 top Arab countries in implementation of egovernment services and applications after UAE, Qatar, KSA, Jordan and Lebanon. Table 1 shows the distribution of documents by affiliation.

No.	Affiliation	Document
1.	United Arab Emirates University	24
2.	University of Sharjah	19
3.	Qatar University	16
4.	Al Ain University	14
5.	American University of Sharjah	13
6.	Abu Dhabi University	12
7.	King Saud University	11
8.	Zayed University	9
9.	Yarmouk University	8
10.	American University of Beirut	8
11.	Sultan Qaboos University	8

Table 1. Distributions of articles by affiliation

3.4 Documents by Territory

Classification of initial search documents by country shows that UAE is in the top of the list with 167 documents followed by US with 93 articles and UK with 72. KSA is in the fourth top ten with 47 documents and Jordan in the fifth place with 38 documents. The other Arab countries in the top ten are Qatar with 27 and Egypt 25 with documents. The top 10 countries included also researchers from un-Arab region or conducted some studies in the Arab e-government such as US, UK, Australia, Malaysia and Germany. Other Arab countries that are not among the top 10 are Oman with 14 studies; Iraq also 14 documents, Bahrain 11, Lebanon 10 and Kuwait with 7 documents. The rest of Arab countries conducted less than 5 researches during the determined time (2000-2024).

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Fig. 5. Distribution of documents by country

3.5 Documents by Type and subject

After removing the doublication studies from both databases (Scopus and WoS), 715 documents were remained. The distribution of these documents by type is illustrated in table 2. The majority of papers are original research, book chapters and reviews.

Table 2. Distribution of papers by their type

Article	Conference Paper	Book Chapter	Review	Conference Review
394	111	84	29	18

3.6 Document by Subject Area

Further analysis is conducted to categorize search on e-government by subject areas. The distribution of documents shows that 26.8% of articles were in social science, followed by computer science with 16.7% and business management with 10%. The rest subject areas included 46.5% of the total number as illustrated in figure 6.



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Fig. 6. Distribution of articles by subject area

The top 10 subject area is presented in Table 3. The initial search shows that three fields including social science, computer science and business management represent more than half of the research in e-government in the Arab region. Other research was conducted in arts and humanities, medicine, engineering, economic, environment and energy.

Subject Area	Document
Social Sciences	295
Computer Science	184
Business, Management and Accounting	110
Arts and Humanities	82
Medicine	70
Engineering	68
Economics, Econometrics and Finance	59
Environmental Science	42
Decision Sciences	40
Energy	20
Other Subjects	130



3.7 Document by Author

The final step in our metadata analysis is to present the top authors in e-government research in the Arab region. Figure 7 shows the top 10 authors in the field where most of them are active in Arab affiliations. Their search includes 3 to 4 research during last 20 years in egovernment related to the Arab region.



Fig. 7. Top 10 authors of e-government in Arab region

4. Bibliometric Analysis

Using VOSviewer, further analysis is conducted to construct and visualize bibliometric networks. The aim of this analysis is not to repeat metadata analysis, but to explore the context of related studies of e-government in Arab region. We run the analysis based on the text of 52 documents used in final stage of our data selection, after inclusion and exclusion criterions. The results of this analysis are illustrated in figure 8.



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Fig. 8. Clusters of e-government in Arab Region

In figure 8, three clusters were identified illustrating the topics related to the e-government in the Arab region. The first cluster, in red, is related to e-government where most of research were based on the country, citizens interaction with e-government, and usage of egovernment application and services. The second cluster, in green, shows the challenges, issues and factors of e-government in the Arab region. The third cluster, in blue, shows the technologies, services and information related to e-government in the region.

Furthermore, Table 4 illustrates the occurrences and relevance score of e-government in the Arab region. Occurrences refer to the number of times a particular event or data point appears within a dataset, providing insight into patterns and trends. The relevance score, on the other hand, assigns a numerical value to each occurrence based on its significance or impact on the overall analysis. The results of 52 articles analysis shows that government was in the top with 130 occurrences while the other numbers were under 50 meaning that occurrences of these words were differentiated. In addition, the recent articles in e-government in the Arab region were conducted during the pandemic Covid-19 where the relevance score was the highest in both items. The rest relevance scores show the impact of the top terms on overall analysis of e-government in the Arab region.



id	Term	Occurrences	Relevance score
1	Arabic	20	0.7166
2	challenge	39	0.5811
3	citizen	24	0.2745
4	covid	32	2.7826
5	evidence	32	0.7017
6	government	130	0.4248
7	information	30	0.4217
8	literature	37	1.2633
9	model	49	0.3778
10	pandemic	29	3.2452
11	person	27	0.9439
12	region	45	0.3455
13	Saudi Arabia	22	0.4699
14	time	25	0.9454
15	UAE	49	0.7523

Table 4. Occurrences and relevance score

Using Wordstat software, we conducted further analysis to identify the words associated with e-government in the Arab region. Word cloud visualization illustrate that government was in the heart of diagram. In addition, other words such as cloud, system, computing, technology, performance, knowledge and services are the largest and boldest word in the cluster. Figure 9 illustrates the word cloud for e-government documents used in the analysis in the Arab region.



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Fig. 9. Word Cloud

Final step in bibliometric analysis is determining the keyword frequencies regarding 52 documents used in this SLR. The results show the top 25 words using Wordstat software. Government is in the top list followed by system. We used the titles and abstract and keywords of the 52 documents in e-government in Arab region. Some of the keywords are presented in the table, but they look less relevant to the subject. The frequencies of these keywords have ranged between 50 to 400 times. Figure 10 shows the distribution of keywords based on their frequencies. Figure 10 shows the keywords distribution of the most frequented words if the total documents used in this literature review.







Fig. 10. Keyword Distribution

5. Thematic Analysis

Further step in our SLR is to determine the most related themes to e-government, as identified from the 52 sources. After descriptive and bibliometric analysis, we conducted in deep analysis for these documents to explore subjects, themes and related areas to e-government implementation and its applications in Arab region. The highest keywords and themes include the following areas:

5.1 Theme One: Citizen Centricity

This theme emphasizes putting the citizen at the heart of public services. It involves developing the capacity to act as a single enterprise, organizing around citizens' demands and expectations, and creating flexible organizational structures to serve citizens effectively [24, 25]. The concept of "citizen centricity" in e-government has become increasingly important as governments strive to enhance their services and improve citizen engagement. Citizen centricity refers to the approach where government agencies prioritize the needs and preferences of citizens in designing, implementing, and delivering digital services [26]. This entails utilizing user-friendly interfaces, personalized communication channels, efficient feedback mechanisms, and transparent decision-making processes to ensure that citizens

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have easy access to information and services [24]. By adopting a citizen-centric approach, governments can not only increase efficiency and effectiveness in service delivery but also enhance trust and satisfaction among their constituents. However, citizen centricity in e-government plays a crucial role in promoting transparency, accountability, and responsiveness within public administrations.

5.2 Theme Two: Standardized Common Infrastructures

This pillar focuses on establishing standardized digital infrastructure to support e-government initiatives ensuring that digital services are integrated and accessible across different platforms [27]. By adopting standard protocols, formats, and technologies, e-government initiatives can streamline processes, reduce duplication of efforts, and enhance efficiency in service delivery to citizens [28]. Common infrastructure elements such as data exchange standards, authentication mechanisms, and security protocols help create a cohesive digital ecosystem that facilitates the sharing of information across various platforms and systems [29]. Additionally, standardized infrastructures enable governments to leverage economies of scale by avoiding redundant investments in technology development and maintenance. The adoption of standardized common infrastructures plays a key role in promoting transparency, accountability, and citizen-centricity in e-government services.

5.3 Theme Three: Back-Office Reorganization

Back-office reorganization in e-government refers to the strategic restructuring of administrative functions and processes within government agencies to enhance efficiency, effectiveness, and service delivery [30, 31]. This theme involves reorganizing the back-office operations to streamline processes and improve efficiency. It aims to reduce costs and enhance the delivery of public services. This involves streamlining workflows, optimizing resources, improving communication channels, and implementing digital technologies to automate routine tasks [32]. By centralizing back-office operations, agencies can eliminate redundant processes, reduce operational costs, minimize errors, and increase productivity. Additionally, reorganizing the back office allows agencies to better align their resources with strategic goals and priorities while ensuring compliance with regulations and standards [33]. Through this initiative, governments can improve transparency, accountability, and overall performance in delivering public services effectively and efficiently to citizens. In conclusion, back-office reorganization is essential for modernizing government operations and achieving greater agility and responsiveness in the rapidly evolving digital landscape.

5.4 Theme Four: Governance

Good governance is crucial for e-government. This includes setting clear policies, ensuring transparency, and promoting accountability in the use of digital technologies. Governance in e-government refers to the efficient and effective management of digital technologies and



information systems within a government framework [34]. This includes identifying priorities, setting policies, allocating resources, monitoring performance, and ensuring accountability. A robust governance structure is crucial for promoting transparency, enhancing citizen engagement, optimizing service delivery, and safeguarding data security in the realm of e-government. It involves defining roles and responsibilities, establishing guidelines for decision-making processes, fostering collaboration between different stakeholders, and adhering to regulatory compliance standards [35]. By implementing sound governance practices in e-government initiatives, policymakers can streamline operations, mitigate risks associated with digital transformation, drive innovation through technology adoption, and ultimately cultivate a more responsive and agile public administration ecosystem that meets the evolving needs of citizens in the digital age.

5.5 Theme Five: New Organizational Models

This theme involves adopting new organizational models that are adaptable to the digital environment. These models encourage innovation and flexibility in the way government services are delivered. In addition, these models are centered around more efficient use of technology, data-driven decision making, and increased collaboration among government agencies [36]. One example of this is the adoption of cloud computing, which allows for greater scalability, flexibility, and cost-effectiveness in delivering digital services. Additionally, there is a shift towards agile methodologies in project management to enable faster development and implementation of new initiatives. Furthermore, the concept of user-centric design is becoming increasingly important, with governments focusing on creating intuitive and customer-friendly online platforms for citizens to interact with government services [37]. These new organizational models in e-government are helping to streamline processes, enhance user experiences, and ultimately improve the efficiency and effectiveness of public service delivery.

5.6 Theme Six: Social Inclusion

Social inclusion is a critical aspect of e-government, ensuring that all citizens have equal access to digital services and benefits. This aims to bridge the digital divide and promote equity in service delivery [38, 39]. Furthermore, social inclusion in e-government refers to the incorporation of marginalized and underrepresented groups into digital platforms and services offered by the government. It is essential for promoting equal opportunities, enhancing civic participation, and improving access to public services for all citizens regardless of their socio-economic status, gender, race, or abilities. To achieve social inclusion in e-government, policymakers need to ensure that online services are accessible and user-friendly for individuals with disabilities, provide training and support for low-income populations to navigate digital technologies effectively, and address language barriers that may hinder participation among immigrants and non-native speakers [40, 41]. By promoting social

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inclusion in e-government initiatives, governments can foster a more inclusive society where everyone has equal access to information and resources needed to thrive in the digital age.

5.7 Theme Seven: Service-Dominant Logic

This theme is characterized by a service-based logic where the government supplies digital services that citizens are expected to adopt involving assessing the quality of services using statistical analysis of surveys [42]. Service-Dominant Logic (SDL) is a paradigm shift in marketing that emphasizes the co-creation of value between service providers and customers. When applied to e-government, SDL posits that government agencies should view citizens as active participants in the creation of public services rather than passive recipients. By adopting this perspective, e-government systems can focus on delivering personalized and interactive services that meet the evolving needs and preferences of citizens [43]. This approach emphasizes collaboration, flexibility, and continuous improvement in service delivery, ultimately leading to higher citizen satisfaction and improved outcomes. Through the lens of SDL, governments can better understand the unique value exchanges that occur within the digital ecosystem, leading to more efficient and effective governance processes that benefit both citizens and public administrators.

5.8 Theme Eight: Digital Infrastructure Evaluation

The evaluation of digital infrastructures is essential to ensure that investments in egovernment initiatives are effective. This involves assessing the complexity of digital infrastructures and their potential benefits. In addition, digital infrastructure evaluation in egovernment is a critical process that assesses the effectiveness and efficiency of the technological systems supporting government operations [44]. By conducting thorough evaluations, agencies can identify gaps, vulnerabilities, and areas for improvement within their digital infrastructure. This includes examining hardware, software, networks, security protocols, and data management practices to ensure they are aligned with best practices and industry standards. Evaluations also help identify opportunities for streamlining processes, reducing costs, enhancing cybersecurity measures, and improving user experiences [45, 46]. It is essential for governments to regularly evaluate their digital infrastructure to keep up with rapid technological advancements and evolving threats in order to provide efficient services to citizens and stakeholders. Regular assessments can lead to informed decision-making processes that drive significant improvements in e-government operations and service delivery.

5.9 Theme Nine: User-Centered Services

This theme emphasizes the importance of designing public policies and services around the needs of citizens and businesses. It aims to leverage digital technologies to deliver holistic and user-centered services [47]. This approach involves understanding the behaviors, motivations,

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and expectations of citizens who interact with government websites and applications, in order to create a seamless and efficient user experience. By prioritizing user-centric design principles, such as intuitive navigation, responsive layouts, accessibility features, and personalized content, e-government services can enhance citizen engagement, increase transparency and trust in government institutions, and streamline processes for accessing public information or submitting requests [48]. In addition, user-centered services in egovernment aim to improve overall satisfaction among citizens while promoting greater efficiency and effectiveness within government operations. This approach requires continuous feedback mechanisms and iterative improvements based on user research and data analytics to ensure ongoing alignment with citizen needs and preferences.

9.10 Theme Ten: Emerging Themes in Digital Government

Other emerging themes include the need for governments to learn faster, upskilling government employees, and using iterative and rapid prototyping methods to design and implement digital services effectively [49, 50]. One prominent theme is the growing emphasis on citizen-centric design, where the focus is on creating user-friendly interfaces and personalized experiences for individuals interacting with government platforms. Additionally, there is a rising trend towards data-driven decision-making, allowing governments to leverage analytics and insights to optimize processes and enhance service delivery. Cybersecurity and privacy have also become critical themes as governments grapple with safeguarding sensitive information while ensuring transparency and trust among citizens [51, 52]. Furthermore, the acceleration of digital transformation initiatives underscores the need for strong leadership, agile methodologies, and innovative solutions to address complex challenges in today's rapidly evolving digital landscape within e-government.

6. Content Analysis

6.1 Challenges of e-government in the Arab Region

The challenges facing e-government in Arab countries are multifaceted and can be categorized into several key areas. Based on our analysis of 52 articles, we found the main challenges and categorized them in four forms, including: technical challenges, social challenges, organizational challenges, political and legal challenges, capacity building, public trust and confidence and transition to M-government. Figure 11 explains the main challenges of e-government in the Arab region.



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Fig. 11. E-government challenges in the Arab region

6.1.1 Technical Challenges:

- Infrastructure: The development and maintenance of robust digital infrastructure, including reliable internet connectivity and secure data storage, are significant challenges [53].
- Data Security: Ensuring the privacy and security of citizen data is crucial, but it poses a technical challenge, especially in countries with limited cybersecurity expertise [54].

6.1.2 Social Challenges:

- Digital Divide: The gap between those who have access to digital technologies and those who do not is a major social challenge. This divide can hinder the effective implementation of e-government services [11].
- Cultural and Social Barriers: Cultural and social factors can influence the adoption of egovernment services. For example, some citizens may not be comfortable using digital services due to cultural or social norms [19].

6.1.3 Organizational Challenges:

- Bureaucratic Red Tape: The complexity and inefficiency of government bureaucracies can hinder the implementation of e-government initiatives. Streamlining processes and reducing bureaucratic barriers are essential [55].
- Lack of Coordination: The lack of coordination between different government departments and agencies can lead to fragmented e-government initiatives, reducing their effectiveness [56].



6.1.4 Political and Legal Challenges:

- Regulatory Frameworks: The absence of clear regulatory frameworks or the lack of alignment with existing laws can create legal challenges for e-government initiatives [57].
- Political Will: The political will to invest in and sustain e-government initiatives is crucial. However, political instability or lack of commitment can hinder progress [58].

6.2 Capacity Building:

Human Resources: The lack of skilled personnel with expertise in ICT and e-government can be a significant challenge. Governments need to invest in training and capacity building to ensure that their workforce is equipped to handle e-government initiatives [59].

6.3 Public Trust and Confidence:

Building Trust: Developing public trust and confidence in e-government services is essential for their success. This involves ensuring transparency, accountability, and the security of citizen data [60].

6.4 M-Government Transition:

Transition from E-Government to M-Government: The transition to mobile government (mgovernment) poses additional challenges, including ensuring that mobile technologies are accessible and user-friendly for all citizens [61].

6.5 Potential Development areas

Furthermore, As Arabic countries are considered as developing countries with different level of ICT adoption and implementation, we also do further content analysis for the 52 documents related to e-government in the region. The potential development areas and opportunities for e-government in Arab countries can be identified from several key points including digital infrastructure development, cybersecurity and data protection, human capital development, citizen-centric approach, emerging technologies, open data initiatives, Economic and Social Benefits, regional initiatives and collaboration and evaluation of e-government in MENA region.



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Fig. 12. Potential development areas

Digital Infrastructure Development:

- Investment in Broadband [62]: Enhancing broadband infrastructure to ensure high-speed internet access across the region is crucial for effective e-government services.
- Mobile Technology [63]: Leveraging mobile technology to improve service delivery and increase citizen engagement. Countries like the UAE have already shown significant progress in this area, with high smartphone penetration rates.

Cybersecurity and Data Protection:

- Enhancing Cybersecurity Measures: Ensuring the security and privacy of citizen data is essential. This includes implementing robust cybersecurity measures and data protection policies [64].

Human Capital Development:

- Training and Capacity Building: Investing in training and capacity building for government employees and citizens to exploit emerging technologies like AI, blockchain, and big data [53].
- Enhancing E-Participation: Fostering a citizen-centric approach by enhancing eparticipation and engagement. This includes promoting open government principles, better transparency, and accountability [65].

Interoperability and Integration:

- Improving Interoperability: Breaking down silos between different IT systems to improve collaboration between government departments. This will enhance the efficiency and effectiveness of e-government services [66].



Emerging Technologies:

- Adoption of Emerging Technologies: Encouraging the use of emerging technologies such as AI, blockchain, and big data to improve service delivery and governance. Only a few countries in the region have plans for these technologies, offering significant opportunities for development [67].

Open Data Initiatives:

- Promoting Open Data: Implementing open data initiatives to support informed decisionmaking and policy development. This includes developing legal frameworks for open government and open data.

Regional Initiatives and Collaboration:

 Fostering Regional Collaboration: Participating in regional initiatives and collaborations to share best practices and accelerate the development of e-government in the Arab region.
 For example, the ESCWA project on open government has facilitated workshops and advisory services across several countries [68].

Economic and Social Benefits:

 Enhancing Economic Competitiveness: Improving e-government services can enhance economic competitiveness by making it easier for businesses to operate globally. This is particularly promising for countries in the GCC region, which have already shown significant progress in e-government development [69, 70].

Monitoring and Evaluation:

 Implementing Monitoring and Evaluation Mechanisms: Establishing robust monitoring and evaluation methodologies to assess the effectiveness of e-government initiatives and identify areas for improvement. This will help in making informed decisions and ensuring continuous improvement [71].

7. Conclusion

The adoption of e-government in Arab countries differ from one country to another. In this review, we identified the current research in e-government in Arab region. The UAE was in the top of the list among Arab countries where 6 top universities that conducted research in the area were from UAE. In addition, the other gulf countries including KSA, Qatar and Oman were among the top 10 institutions that publish works in e-government. These results reflect the reality of e-government applications and services implementation in these countries. The results also reveal bibliometric data regarding the year of publications, top sources, top research area and top authors. Furthermore, we conducted thematic analysis to further investigate the related areas to e-government implementation. These themes include citizen



centricity, standardized common infrastructures, back-office reorganization, new organizational models, service-dominant logic and other areas. The results also indicate the potential development areas including infrastructure development, cybersecurity and data protection, human capital development, emerging technologies and regional initiatives and collaboration. Finally, we identified challenges related to e-government adoption and development in the Arab region such as technical challenges, social challenges, organizational challenges, political and legal challenges and public trust and confidence. These results provide researchers and stockholders, policy makers and interested parties' insights and knowledge of e-government in the Arab region.

7.1. Implications and Limitations

The use of electronic communication technologies to improve and enhance government services and interactions with citizens, has significant practical and social implications. From a practical standpoint, e-government can streamline processes, reduce bureaucracy, and increase efficiency through online services such as electronic filing of taxes or applications for permits [72]. This can result in cost savings for governments and increased convenience for citizens. Socially, e-government can promote transparency, accountability, and citizen participation in decision-making processes [73]. By providing easy access to information and services online, governments can foster greater trust and engagement with their constituents. However, it is important to address issues related to digital literacy, data security, and access disparities to ensure that e-government initiatives benefit all segments of society equitably.

From an economic perspective, e-government can lead to cost savings through automation of processes and reduction in paperwork. It can also facilitate more transparent and accountable governance by providing citizens with access to public information and services online [74]. Additionally, e-government can promote economic development by attracting investment and fostering entrepreneurship through streamlined business registration processes [75]. Culturally, e-government can enhance civic engagement by enabling citizens to participate in decision-making processes electronically, thereby promoting a more inclusive and democratic society. Although, challenges such as digital divides and concerns about data privacy must be addressed in order to fully realize the potential benefits of e-government on both economic growth and cultural development.

Regarding the limitation in this SLR, we encountered some limitations related to egovernment literature where we concentrated on the Arab region. In addition, the prior works in e-government in Arab countries were limited. We mapped the current knowledge of egovernment emphasizing the current state, themes and keywords, potential developments and challenges related to e-government in the Arab region without cases or examples of egovernment structure or implementation.



7.2. Future Works

Research in e-government started with the beginning of using internet and adoption of technology in different fields. The future works should focus more in artificial intelligence applications and data analytics to enhance government services, streamline processes, and improve decision-making. Automation will play a key role in improving efficiency and reducing bureaucratic hurdles for citizens interacting with government agencies where scholars should pay more attention for. Additionally, there is likely a shift towards personalized and interactive platforms that cater to the unique needs of individuals, offering tailored information and services based on user preferences. Cybersecurity measures also become even more critical as governments collect more data digitally, requiring robust protection mechanisms to safeguard sensitive information. Researchers should also investigate the collaboration between different government entities and private sector partners that significantly increase to create seamless digital experiences for citizens.



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