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E-Government Between Developed and Developing Countries: Key Perspectives from Denmark and Iraq

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Abstract

E-government involves using technology to provide public information and services digitally. This study examines key factors addressing infrastructure, cultural, political, technical, and social challenges in e-government implementation. By exploring diverse contexts, from citizen engagement to data frameworks, it will elucidate best practices and lessons for overcoming hurdles on the bureaucratic and user sides. The research aims to uncover how states can successfully transition services online. Insights can inform policymakers seeking to digitize governance and leverage information and communication technologies to improve state-citizen relations. Additionally, it aims to compare and analyze e-government systems in a developing country (Iraq) and a developed country (Denmark) to highlight key differences that could inform e-government development efforts in developing nations. And in resreach the PRISMA approch was adopoted to help present the findings of a systematic review. Iraq and Denmark were chosen due to the disparity between their e-government systems, enabling the identification of weaknesses in Iraq's e-government initiatives and providing insights from Denmark's more advanced experience. This study has identified several common obstacles encountered across different contexts in the implementation of e-government systems, irrespective of whether the country is developed or developing. Examining this e-government gap between a developing and developed country will allow developing nations like Iraq to pinpoint areas for improvement and potentially benefit from Denmark's success in this area.

Keywords: *Developing Countries;Developed Countries;E-Government;challenges;implementation; Iraq; Denmark*

1. Introduction

Contemporary society has entered an information age, succeeding the prior industrial age. This period is distinguished by the ubiquity and integration of information and communication technologies (ICTs) across economic, political, and social domains. The rapid advancement and adoption of ICTs have transformed interactions, enabled new capabilities, and forged unprecedented interconnectivity[1]. However, the realization of the information age's full potential rests on successfully leveraging these technologies to enhance institutions and the quality of life. This requires thoughtful policy, investment, and standardization[2]. Substantial disparities in access to ICT resources persist based on geography, education, and income. Bridging the digital divide through infrastructural development and skill-building is crucial for equitable participation. Furthermore, optimizing ICT implementation without compromising security and privacy remains an ongoing challenge. The information age has unlocked immense possibilities but harnessing its opportunities for sustainable and inclusive progress involves overcoming persistent digital gaps and risks. E-government, a recent ICT innovation, has gained significant prominence.

While some individuals seamlessly integrate technology into their daily lives, others prefer traditional non-digital approaches. The use of ICT tools is now commonplace and embedded in the routines of some, while others are reluctant to move away from non-tech approaches. As the world shifts from the industrial to the information age, e-government has emerged as a vital ICT

advancement, though adoption gaps persist between tech-savvy and offline-preferring groups. Realizing the potential of e-governance requires addressing the needs of the less tech-comfortable through inclusive initiatives like infrastructure and training. Maintaining offline channels during the transition is also important to avoid disenfranchising parts of the populace. Hybrid physical-virtual models can enable smoother public service digitization. Through phased patient implementation and inclusive policies, states can extend e-government benefits to all citizens regardless of digital proficiency [3].

However, the technological and communication advancements of the 21st-century information revolution have led to significant lifestyle changes worldwide. These developments need governance through electronic government (e-government) systems that regularly interact with businesses, employees, and citizens. Information and communication technology (ICT) serves as the foundation of e-government, empowering both the public and government to access enhanced services and readily available information. E-government has gained significant global traction, facilitating more convenient and adaptable lifestyles. This technology streamlines resource allocation and encourages public participation in assessing and evaluating government performance[2]. Successful e-government adoption depends on citizens transitioning from offline to online engagement with public services. Without the willingness to use e-governance tools, digitization benefits are limited. Drivers include perceived usefulness, ease of use, social influence, infrastructure, and government promotion. Overcoming status quo bias requires communicating improvements over prior systems and boosting digital literacy/access. Public-private readiness initiatives and cohesive national frameworks can help increase online adoption. Fostering e-government usage necessitates addressing both psychological and practical barriers through a participatory process tailored to varied contexts [4].

Additionally, the world witnessed rapid advancements in information and communication technologies (ICT) that exceeded expectations, leading to tremendous changes politically, economically, and socially worldwide [5]. The implementation of e-government services in Iraq faces barriers such as insufficient government policies, poor e-government infrastructure, weak cybersecurity protections, and an unstable political situation [6]. The unstable political climate in Iraq inhibits citizen participation in e-government efforts. It's important to note that public trust in e-government is influenced not just by technological sophistication but also by website features and content. More broadly, citizens' trust in governmental institutions and officials helps shape attitudes toward adopting e-government services. Building confidence in government as a whole is crucial for fostering acceptance of e-government initiatives. Numerous problems cause uncertainty among citizens regarding using e-government services, such as insufficient regulations, immature systems, absent security laws, and volatile politics. Although technology itself does not solely establish trust, website features are still key. Most importantly, people's confidence in government authorities and officials is essential for developing stances toward e-government adoption [7].

In today's digital age, information and communication technologies (ICT), particularly the internet, are widely adopted by citizens and businesses. Beyond enabling private services, the internet can also facilitate high-quality public services [8] As a result, e-government initiatives are pursued in the public sectors of both developing and developed nations to enhance efficiency, responsiveness, and transparency. E-government is considered a more productive and useful approach for governments to interact with constituents and users [9]. E-government initiatives aim to automate processes for serving citizens, organizations, governments, businesses, and various stakeholders globally. However, in developing countries, many governments view e-government systems as costly to implement in terms of resources, technical expertise, and infrastructure [10].

Therefore, this study aims to conduct a comprehensive literature review to identify and extract key constructs. These constructs will be used to establish a comparative analysis between Iraq and Denmark, representing developing and developed countries, respectively. The study examines and highlights core factors significant in the success of e-government systems by contrasting implementations in developed and developing nations, and this factors align with various e-government frameworks such as the UN E-Government Development Index (EGDI), the E-Government Adoption Model (EGAM), and the Digital Governance Framework (DGF). These frameworks assess e-government initiatives based on infrastructure, cultural, political, technical, and social factors. Analyzing these factors helps gain a comprehensive understanding of e-government landscapes in Denmark and Iraq, enabling meaningful comparisons and insights into the challenges and opportunities faced by each country[11], [12], [13].

It specifies issues and challenges with e-government adoption in developing countries. By exploring e-government constructs employed by developed nations, the study seeks to identify

strategies for overcoming obstacles through leveraging technological and scientific advancements and ICT systems. Additionally, the research contrasts specific cases of Iraq and Denmark across e-government dimensions to pinpoint weaknesses and strengths in both countries' e-government systems. Overall, this comparative analysis of e-government in developing and developed country contexts identifies crucial success factors, barriers, and opportunities to progress e-government capabilities in developing nations. Moreover, there are gaps in internet technology infrastructure, usage, and practices between Iraq and Denmark that have widened in recent years.

Hence, Denmark was selected due to its leadership in e-government, ranking among the top ten countries globally in system development and adoption. Denmark's e-government processes are notably advanced, with the highest percentage of citizens utilizing e-government services in the EU, reaching 92% of Danish internet users. Examining Denmark provides insights into sophisticated e-government systems in developed nations and identifies success factors that developing countries can leverage, considering contextual differences. Comparing Iraq and Denmark highlights divides in internet infrastructure, accessibility, and e-government maturity, offering insights to enhance e-governance capabilities in developing countries. In summary, the case studies of Denmark and Iraq were likely chosen for their contrasting contexts, which can provide a broader understanding of the factors that influence the success or failure of e-government initiatives[14]. This comparative analysis can contribute to the broader discourse on e-government and help inform policymakers and researchers in developing effective strategies for e-government implementation across diverse contexts.

Hence This study contrasting with previous studies that predominantly focus on either developed or developing countries individually, thereby offering new insights into the diverse factors influencing e-government success[10], [15], [16], [17].

This study examines the following research questions:

1. How do the e-government systems of developed and developing nations differ, as exemplified by the cases of Denmark and Iraq?
2. What advantages do developing countries like Iraq gain from developed countries like Denmark in order to improve their e-government systems?

2. Literature Review

E-government refers to the implementation and integration of electronic systems for administration, management, and democratic processes within the government to deliver information and services through information and communication technologies (ICTs). It involves using ICTs to provide information to citizens and support public functions effectively and efficiently. In simple terms, e-government means adopting technological systems across government operations and interactions to enable digital governance, administration, and democracy, providing improved public access and services [18]. The term 'e-government' was first coined in the United States of America (USA) in 1993, referring to the concept of improving governmental operations and responsibilities through the application of information and communication technologies (ICTs). The idea of transforming governance and public services via technological systems originated in the US in the early 1990s as 'e-government', denoting the advancement of government duties by leveraging ICT tools and solutions [19]. US Vice President Al Gore introduced this term in reference to connecting citizens with various government departments to obtain public services automatically and electronically. The concept of 'e-government' emerged from former US Vice President Al Gore as a way to link community members to different government agencies and access government services seamlessly in a digital manner [20]. Additionally, by 2014, all member countries of the United Nations had established national government websites. Around 50 countries have also developed online government portals, doubling the number since 2012 [21].

However, there is no universally accepted definition of e-government, leading to multiple interpretations by various experts. Most definitions emphasize governments leveraging technology to enhance services for citizens. E-government broadly refers to governments adopting information and communication technologies (ICTs) to deliver services and engage with the public and private sectors through various digital platforms such as computers, mobile phones, kiosks, email, websites, and data systems. The main goal is to use technological tools to make service provision, communication, and stakeholder interactions more efficient, accessible, and effective. While exact definitions may vary, the common emphasis is on governments employing technology to improve how they serve and connect with society [22].

However, the wide range of definitions for e-government mostly stems from the fact that each country approaching e-government implementation has its own distinct vision, goals, requirements, culture, and resources available. Countries have differing perspectives and contexts, leading to varied concepts of what e-government entails. The specific needs and capabilities of a nation shape its understanding and application of e-government. With customized objectives, assets, and social environments, countries construct their own meaning and models for e-government based on their individual circumstances and capabilities [23]. E-government involves adopting information and communication technologies (ICT) to deliver government services and operations to citizens and businesses in a productive and useful way. The core idea of e-government is leveraging digital technologies to improve the processes and outputs of public administration and services. By incorporating tools like software, internet applications, mobile platforms, and data management systems, government agencies can streamline their internal workflows and external interactions with the public. The goal is to boost the access, convenience, transparency, and responsiveness of governmental functions through digital means. Done well, the digitization of government can benefit both administrators and constituents through enhanced efficiency, speed, and quality of state services and information exchange [24], [25].

Hence, E-government involves harnessing information and communication technologies (ICTs) to reshape and improve public services, making them more available, responsible, and productive. Experts have conceptualized e-government in different ways, ranging from comprehensive to more limited perspectives. Some common viewpoints examine the technological, administrative, or political dimensions of e-government transformation. Broader definitions characterize e-government as the overall use of digital tools to remake how public services operate and deliver value. More focused meanings view e-government specifically through the lens of technology innovation, management strategies, or political reform. Despite these varied perspectives, there is a shared emphasis across definitions on utilizing ICTs to increase government accessibility, accountability, and effectiveness for citizens. Scholars may analyze e-government from various viewpoints, but they generally agree that it encompasses the digital modernization of public services and administration for the public good [6], [26].

Unlike traditional government services, e-government offers several advantages by providing citizens with 24/7 access and interaction online. Traditional models often have limited operating hours and availability for government offices and resources. In contrast, e-government services and information are continuously accessible with an internet connection. Around-the-clock availability is a major benefit, allowing citizens to conduct transactions, find information, utilize services, and connect with government representatives at any time efficiently and conveniently. By digitizing services and resources, e-government removes restrictions like set schedules, location-based access, and outdated communication methods. Citizens can access what they need when they need it, with much greater flexibility and responsiveness. The anytime, anywhere capability brings improved citizen experience and satisfaction compared to traditional government services with restricted hours and access [9].

Additionally, e-government enables new types of services and capabilities that traditional government models cannot provide. For example, e-government allows faster processing, higher quality services, remote access eliminating the need for in-person visits, enhanced transparency, closer citizen engagement, and less bureaucracy. By digitizing and optimizing workflows, e-government speeds up operations and reduces delays compared to paper-based systems. Service quality improves through standardization, automation, and data-driven insights. Citizens do not have to physically go to government offices to access services, reducing transportation and wait times. Transparency increases through public online data and communication. Digital channels like social media facilitate greater citizen participation and collaborative policymaking. Integrated digital systems result in less redundant paperwork and complex protocols within government agencies. In these ways, e-government introduces new benefits in convenience, responsiveness, and streamlining that traditional government services cannot match. Digital capabilities fundamentally improve the connections and interactions between government and citizens [27].

One major potential benefit of e-government is improved efficiency and lower costs by reducing manual, paper-based work. By digitizing records and automating processes, e-government decreases the human effort and labor needed to complete tasks. This allows the same activities to be handled by fewer staff members, cutting down on personnel expenses for public services. Additionally, the expanded accessibility of e-government services leads to greater citizen engagement and public participation with government organizations. More digital channels for citizens to interact with and

utilize public services can build citizen trust, satisfaction, and involvement through enhanced reach and user experience. Citizens feel more empowered and connected when the government is transparent and interactive. Therefore, e-government has the dual advantages of reducing operating costs through technology while also boosting public participation and approval through expanded digital access and exchange. Automation and accessibility combine to create services that are more efficient, connected and citizen-centered [28], [29].

In recent times, implementing e-government has become a top priority globally, with all nations aiming to transition from traditional government to e-government models. This priority is rapidly gaining momentum, particularly in developing countries. Governments have unique perspectives, roadmaps, processes, and tactics to deploy and construct efficient e-government frameworks [13]. Nowadays, there is an ongoing transition from traditional government to e-government. This transformation process encounters numerous challenges that influence and shape the political, organizational, technical, cultural, and social facets of governmental services and other institutions that interface with the government [30].

In general, resource limitations in developing countries preclude the exclusive allocation of resources to e-government initiatives. Furthermore, these nations can benefit from the experiences, both positive and negative, of developed countries in implementing e-government solutions [8]. Developing countries, also known as less economically developed countries, are nations with a low standard of living and are not industrially advanced. Their Human Development Index is lower compared to other developed countries with high living standards and industrialization [31]. Additionally, there are significant differences in various aspects of the adoption of e-government in developing countries, heavily impacted by the existing social and technological circumstances, which diverge considerably from developed nations. As a result, the ideas, strategies, and lessons from e-government rollouts in developed countries may not be directly applicable to developing country contexts. Developing nations confront distinct obstacles such as limited public awareness about computer science and ICT, as well as inadequate technology infrastructure and skills. Higher poverty, illiteracy rates, and lack of internet access hamper e-government readiness compared to developed regions. Therefore, developing countries require tailored e-government approaches suited to their specific technological and socioeconomic realities on the ground. Strategies effective in developed countries serve as useful references but require adaptation for developing country needs and constraints, posing significant obstacles to successful e-government implementation [12].

In many nations, it has been noted that the core objectives of e-government have not been achieved. This failure can be attributed to various factors, including technical, organizational, political, social, and other aspects. Multiple underlying reasons contribute to the unsuccessful implementation of e-government in achieving its main goals [32]. E-government initiatives aim to improve government performance and efficiency. When properly implemented, e-government can enhance governmental services for citizens and other agencies, streamline government transactions, and facilitate public participation in decision-making. The overarching objectives are to raise productivity and effectiveness across government operations through digital technologies and online platforms [24], [33]. According to A. Khan et al.[27] state that corruption in developing countries can limit the ability of e-government initiatives to meet stakeholder expectations. Specifically, corruption damages public morale and undermines government oversight standards needed to regulate the overall administrative system. As a result, corruption restricts the capacity of e-government projects to achieve anticipated outcomes. Studies show that in developing countries, between 60% and 80% of implemented e-government projects fail to achieve their intended objectives [6].

Furthermore, Mohammed and Hakizimana, [28], reported that e-government service adoption remains low in developing countries due to the high failure rate and limited functionality of e-government initiatives. They identified key barriers such as inadequate ICT infrastructure, policy and legal frameworks, financial resources, digital illiteracy, and human capital. These fundamental obstacles and challenges continue to hinder e-government advancement in developing nations.

In contrast, all countries have distinct characteristics that differentiate them. The e-government models implemented in developed nations may not be compatible with those in developing countries. Therefore, e-government systems require modification and adaptation to align with the specific contexts and needs of developing nations before implementation. Each country has unique circumstances that must be considered when transferring an e-government framework from one setting to another [11].

3. Methodology

The comparative analysis draws upon a methodical examination of literature, which identifies and scrutinizes pertinent sources and scholarly works. Fundamental tenets of such a systematic review encompass well-defined structure, predefined research questions to guide the process, transparency, and reproducibility of results and findings. Systematic reviews aim to comprehensively survey the literature in a methodical manner to support evidence-based conclusions. Maintaining rigor, objectivity, and consistency is vital when conducting a systematic review of prior research [36].

Therefore, the data used in this study were obtained from secondary sources related to e-government in both developed and developing countries. The research employed a documentation data collection method involving the gathering and analysis of existing documented materials on the topic. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) serves as a sequential systematic review and meta-analysis instrument, aiding authors in presenting outcomes from systematic reviews across diverse forms of published research. PRISMA delineates the process into four distinct stages: identification, screening, eligibility assessment, and inclusion.

The initial phase, identification, encompasses discovery through database exploration and alternative resources. Database identification involves querying diverse repositories such as Scopus, Wiley, Google Scholar, and IEEE. Given the expansive nature of the subject matter lacking a specific taxonomy, an array of pertinent key terms was established to ensure comprehensive coverage. Boolean operators (AND/OR) were employed in conjunction with these keywords to mitigate the retrieval of extraneous literature.The keywords include "e-government in developing countries", "e-government in developed countries", "implementation", "challenges", "success factor", "e-government in Iraq", and "e-government in Denmark". The second stage, screening, involves confining the selection to articles published between 2019 and 2023, while also removing any duplicate entries. The third phase, eligibility assessment, entails choosing articles that meet the predetermined inclusion criteria and discarding those that fall under the exclusion parameters. In the fourth step, articles that successfully navigate the eligibility evaluation are incorporated into the synthesis.

3.1. Inclusion and Exclusion Criteria

The objective of establishing inclusion and exclusion criteria is to guarantee that solely pertinent studies are incorporated into our literature review. We gather research articles from digital repositories that address e-government implementation, with a particular focus on both developing and developed nations. The inclusion parameters for this study encompassed the following attributes:

- The research must have undergone peer review for publication.
- The publication date of the study should fall within the 2019-2023 period.
- Papers focusing on the implementation of e-government initiatives.
- Literature addressing challenges, opportunities, obstacles, barriers, successes, and failures in e-government deployment across developing and developed nations.
- Publications relevant to the research question.

Studies were excluded based on the following criteria:
If it does not fulfill the inclusion criteria.

- Duplicate articles.
- If it is a commentary or editorial paper.
- Unpublished articles.

3.2. Article Selection Process

The article selection process followed the PRISMA guidelines and consisted of four main stages adhering to a defined set of rules. This was done to improve the quality of the systematic literature review and reduce bias in the chosen studies. The first stage involved screening the titles of the initial search results to identify potentially relevant studies, while also removing duplicate entries. The second stage entailed reviewing the abstracts of the remaining papers to further narrow down the selection for full-text review. In the third stage, the full texts of the studies were examined based on predetermined inclusion and exclusion criteria. Ultimately, this process yielded 53 potential studies to include in the review. The study selection process is depicted in Figure 1.

3.3. Quality Assessment

To evaluate the quality and validity of the research studies selected for this review, a rigorous quality assessment measure was employed. Two

researchers independently conducted this assessment to mitigate potential biases. Any differences in their evaluations were discussed until a consensus was reached. Performing quality and bias assessments enhances the credibility and reliability of the review's findings. The specific criteria used for quality assessment were: the appropriateness of the research design in the context of the study, clearly defined aims and objectives, and clearly stated findings as well as limitations of the study.

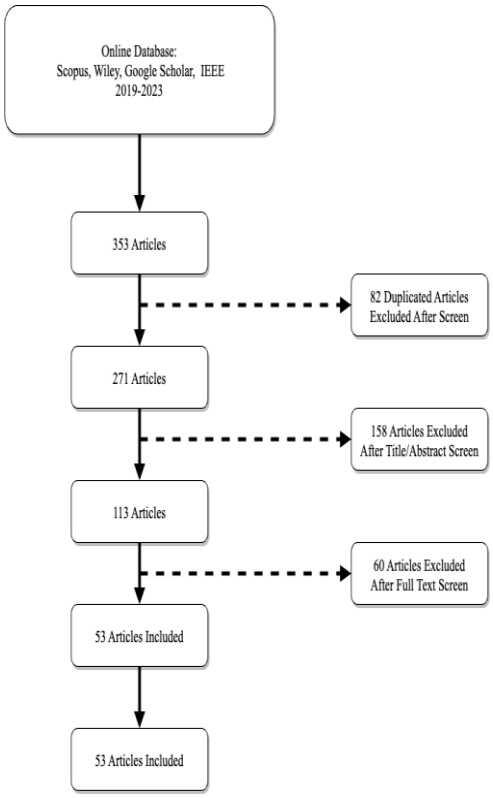

Fig. 1. Stages for selection of academic articles for literature review

3.4. Data Extraction and Synthesis

After the full-text review, the process of extracting and synthesizing data from the selected studies was carried out. Relevant information was extracted and recorded in a predefined form to gain a comprehensive understanding of each study. The attributes documented included the publication title, authors, year, research problem, study focus, key contributions, limitations, and recommended future work. Specifically, this information pertained to the implementation challenges of e-government initiatives in both developing and developed countries, which was the focus of the reviewed studies.

4. E-Government in Iraq

The adoption of e-government in Iraq is relatively recent, and both public and government awareness of it is low. In the initial stages of internet access in Iraq, public availability was severely restricted, confined to a select few internet centers and cafes after its introduction in late 1999. By 2000, out of Iraq's total population of 26.6 million, only 12,500 individuals had internet access, representing a meager 0.1% penetration rate. In 2002, internet usage in Iraq saw a slight uptick to 25,000 users, which represented less than 0.1% of the country's population at that time, which stood at 28 million. This highlighted the remarkably low adoption rates during the early stages of the internet era in Iraq, with less than 0.1% of the Iraqi population online even several years after public access became available. By 2008, the number of internet users had increased to 275,000 out of a total population of 28.2 million, still accounting for less than 1% of the population. It was not until 2009 that the number of users further rose to 325,000, finally exceeding 1% of the estimated 29.6 million Iraqis for the first time.

While internet usage saw some early growth in Iraq, adoption rates continued to lag behind in comparison to the total population during the early 2010s. In 2010, only 3% of Iraqis had access to the internet, with 939,000 users out of a population of 28.9 million. Despite this increasing usage, it still represented a small fraction of the overall population. By 2012, internet adoption had reached 7%, with 2.3 million users out of a total population of 33.8 million in the country. Although the number of internet users was rising, the penetration rate remained relatively low, highlighting the need for further efforts to expand access and promote internet adoption among the Iraqi populace. Citizens began to embrace the internet more widely in the mid-2010s, with 5.6 million users in 2015 out of a population of 33.3 million, representing 15% adoption. Significant growth continued in the late 2010s, with 19.68 million users in 2019 out of a population of 41.58 million, representing 44% adoption. Internet adoption accelerated in the early 2020s, with 31.4 million users in 2022 out of a population of 44.47 million, representing 69% adoption. As of 2023, internet adoption in Iraq has reached close to 75%, with 33.72 million users out of a population of 45.7 million. Over the period from 2010 to 2023, internet adoption in Iraq has seen substantial increases, transitioning from a penetration rate in the single digits to encompassing nearly 75% of the population [36], [37].

Table 1. Individuals' Internet Usage in Iraq

Year	Population	Internet User	Percentage of population
2010	28,900,000	939000	3%
2011	32,400,000	1,600,000	5%
2012	33,800,000	2,300,000	7%
2013	35,500,000	3,200,000	9%
2014	36,750,000	4,700,000	13%
2015	37,750,000	5,600,000	15%
2016	38,700,000	7,700,000	20%
2017	39,620,000	16,000,000	26%
2018	40,500,000	19,000,000	34%
2019	41,580,000	19,700,000	44%
2020	42,550,000	29,800,000	46%
2021	43,530,000	30,500,000	49%
2022	44,400,000	31,400,000	69%
2023	45,700,000	33,700,000	74.9%

Therefore, the Iraqi Ministry of Communications has recognized that Iraq's communication system suffered substantial damage as a result of the conflict in 2003. However, reconstruction efforts have accelerated in recent years, including the announcement of plans in 2007 to deploy a national fiber-optic network to provide internet services to citizens. This highlights that while the war severely impacted Iraq's communication infrastructure, redevelopment initiatives have aimed to restore and improve internet access across the country [10]. Iraq's progress in e-government development and e-participation has been modest, as reflected by the country's E-Government Development Index (EGDI) scores. In 2012, Iraq's EGDI was 137, and its e-participation index stood at 101. By 2022, Iraq's EGDI had increased to 146, and its e-participation index had increased to 153.

However, these scores remain relatively low, indicating that Iraq's e-government development and online engagement have not advanced significantly over the past decade [38]. An analysis of Iraq's EGDI and e-participation scores from the UN reveals that the country's e-government development and online engagement have followed a fluctuating trajectory over the past decade. Iraq's highest EGDI score was achieved in 2014, while its peak e-participation index was reached in 2012. This suggests that Iraq's progress towards e-government transformation has been uneven, highlighting the need for a holistic approach that takes into account the nuances of the country's e-government landscape. Rather than focusing solely on individual metrics or brief periods of progress, it is essential to comprehensively assess Iraq's e-government journey to develop sound strategies and policies that can advance its e-government capabilities and online participation.

Table 2. Iraq's e-government development and e-participation

Year	EGDI	e-participation
2010	136	135
2012	137	101
2014	134	152
2016	141	104
2018	155	140
2020	143	158
2022	146	153

Hence, the implementation of e-government often faces challenges, as most governments initially struggle to use technology to transform their operations. Although these obstacles are typically addressed during the implementation phase, Iraq faces unique challenges that permeate the entire e-government system. Inadequate ICT infrastructure is a significant concern, as Iraq's infrastructure, hampered by instability and conflict, falls short of the robust foundation required for e-government implementation. Internet access is both limited and slow, telecom infrastructure is insufficient, and electricity supply is unreliable. The inadequacy of Iraq's ICT infrastructure, compounded by the country's instability, presents a formidable barrier to e-government implementation. The limited scope and substandard quality of internet connectivity and telecommunications infrastructure, in conjunction with power shortages, create insurmountable technological hurdles for the successful implementation of e-government initiatives in Iraq [6].

In addition, Iraq's internet connectivity remains expensive, unstable, and slow due to insufficient telecommunications infrastructure and unreliable domestic electricity, necessitating reliance on neighboring countries. These high costs, instability, and slow internet speeds pose additional challenges for e-government systems, which require affordable, reliable, and high-speed connectivity. Addressing the telecommunications and power obstacles is imperative for Iraq to enhance its internet capabilities, a prerequisite for the effective implementation of e-government initiatives. Iraq must enhance its internet and telecommunications infrastructure while reducing costs and improving reliability and speed to establish the connectivity foundations essential for e-government programs to flourish [39].

Also, the digital divide encompasses the uneven distribution of access to and utilization of information and communication technologies (ICTs) among various segments of society. It can manifest itself in a variety of ways, including inequities between individuals, households, geographic regions, and businesses. At its core, the digital divide delineates the disparity between

individuals possessing the means and resources to access and utilize the internet and those who lack such opportunities. This gap manifests in the discernible contrast between those capable of online engagement and technological utilization and those who face limitations in this regard. Bridging the digital divide is essential for countries like Iraq that are seeking to deploy e-government programs. E-government programs rely on internet access and ICT literacy to deliver services to citizens. Without universal, affordable internet access and improved digital literacy, e-government services will only be accessible to a privileged few.

Therefore, Iraq must work to close its digital divide by expanding internet connectivity and improving digital literacy. This will ensure that all citizens, regardless of their socioeconomic status, can equitably access e-government services and reap the benefits that they offer [40]. Lack of internet access impedes digital skills development and e-government service utilization. Mitigating the exacerbation of digital divides necessitates the comprehensive promotion of discourse and fostering innovative collaborative approaches that bring together civil society organizations, private sector entities, and government agencies is crucial. Ensuring universal internet access empowers citizens to develop digital literacy skills and actively participate in e-government services and platforms. By facilitating such multi-stakeholder cooperation and promoting widespread internet connectivity, countries can create an enabling environment for citizen engagement with digital governance initiatives. Nevertheless, accomplishing this objective necessitates collaborative efforts across sectors to ensure fairness and inclusivity. Iraq should prioritize inclusive internet access through partnerships among diverse stakeholders to prevent the widening of digital divides and facilitate effective e-government implementation. Multi-sector coordination focused on universal internet connectivity and digital literacy is crucial for Iraq to deploy e-government equitably [10].

Due to the absence of laws and regulations governing ICT adoption, legal or policy obstacles to e-government implementation can arise. The establishment of robust legal frameworks is crucial for fostering and empowering e-government systems. Iraq's lack of a comprehensive ICT regulatory framework presents significant impediments to e-government implementation. For Iraq to successfully develop and implement e-government initiatives, it is crucial to enact ICT laws and policies that promote e-government adoption and address potential obstacles. Leveraging ICT for e-government requires a comprehensive legislative framework that clearly defines relevant laws and regulations, mitigating issues stemming from legal or strategic ambiguity. Iraq needs to establish a transparent legal and regulatory environment for ICT to provide a solid foundation for the rollout of e-government programs. Fostering an enabling legal ecosystem is imperative for the effective execution of e-government in the country [41].

Furthermore, The development of an e-government policy framework must comprehensively address key legal considerations. This includes regulations surrounding information and data security, guidelines for e-commerce activities, provisions related to censorship and freedom of expression, as well as international aspects such as copyright law, intellectual property rights protection, and cross-border legal jurisdictions. An effective e-government policy necessitates a holistic approach that tackles critical areas like safeguarding security and privacy, governing online commercial transactions, upholding civil liberties and freedoms, and managing global technology issues pertaining to proprietary rights and legal jurisdictional boundaries. Adequately addressing these legal dimensions is paramount for a robust e-government policy framework. A robust e-government strategy necessitates the incorporation of laws and policies across security, commerce, civil liberties, and international dimensions to enable successful implementation. Iraq needs holistic e-government legislation that covers key domestic and global issues [6].

Since, corruption and a lack of transparency present significant challenges for developing nations, including Iraq, There is often favoritism and an unethical allocation of opportunities within government regulations and transactions. Nepotism, where preference is given to family relations, and cronyism, where friends and associates are favored, frequently pervade government agencies, notably in hiring and employment decisions. Due to its opaque nature, the public frequently lacks an understanding of government decision-making processes. Corruption and insufficient transparency in Iraq erode public trust and impede the implementation and adoption of e-government. Addressing cronyism and opaque processes through institutional reforms is essential for building confidence and participation in e-government initiatives. Iraq must confront systemic corruption and opacity through reforms that promote fairness, accountability, and engagement [39].

In order to address corruption issues, the Iraqi government must pursue democratic reforms and establish transparent channels of communication between citizens and government entities.

However, this endeavor is compounded by challenges such as high rates of illiteracy, unemployment, poverty, and comparatively lower IT literacy levels in the population when compared to developed nations. Overcoming these socioeconomic and technological hurdles is crucial for facilitating anti-corruption measures and fostering an environment of transparency and accountability in governance. Effectively addressing corruption requires not only democratic reforms but also the establishment of direct communication channels between the public and the government. Furthermore, Iraq needs to confront broader societal issues such as illiteracy, unemployment, poverty, and a deficiency in digital skills, all of which act as impediments to the adoption of e-government compared to more developed nations.

Bridging the existing gaps in literacy levels, economic conditions, and technological capabilities through comprehensive national initiatives will be pivotal for the successful nationwide implementation of e-government services in Iraq [40]. In this context, Iraq's literacy rate of 79.7% for the population aged 15 and above lags behind the rates observed in developed countries. Addressing these disparities through targeted programs and policies will be critical to facilitate the effective adoption and utilization of e-government platforms among the Iraqi populace.

However, regarding all these obstacles, In an effort to advance digital transformation and enhance citizen access to services, the Iraqi government has undertaken several initiatives. These include the launch of an integrated public information platform to consolidate and disseminate information, the implementation of a unified national ID card system to streamline identification processes, and the creation of a single online portal to serve as a one-stop gateway for all public services. (Ur portal), an electronic passport system, and introducing e-payment systems[42]. Through these projects, the government aims to leverage technology to improve service delivery, increase transparency, and provide citizens with more convenient and efficient means of accessing government resources and amenities.

5. E-Government in Denmark

Denmark has a rich history of adopting information technology, with a significant surge in its prominence in policymaking during the 1990s. The country's journey toward achieving a fully digitalized society and public sector, however, traces back to the early 1960s [43]. In alignment with the trends observed in most industrialized nations, Denmark witnessed the emergence of large centralized government databases utilizing mainframe computers during the 1960s and 1970s. This era marked the transition from 'punch card' systems to the implementation of the first electronic databases and archives, particularly for civil registration and the storage of crucial citizen information [43]. The period spanning the 1950s to the 1970s witnessed the introduction of several large, standardized central systems in public administration [17]. These systems played a pivotal role in managing and administering substantial data, including information related to citizens' salaries and taxes. The implementation of these sizable databases was a response to the increasing complexity of the public sector and the growing demand for handling more advanced data effectively.

However, the foundational history of digitization within the Danish public sector took a significant turn in the 1990s. In 1993, technology-related political areas were consolidated under the Ministry of Research. The shift from a social democratic administration to a liberal conservative government in late 2001 marked a notable change in the perception of Danish e-government and the broader role of ICTs in modernizing governance in Danish society [1]. Moreover, A crucial development occurred in 2001 when there was a substantial change in the intragovernmental responsibility for e-government policy.

Initially, all matters pertaining to e-government, the information society, and emerging ICT issues fell under the purview of the Ministry of Research and Information Technology (MRIT), later renamed the Ministry of Science, Technology, and Innovation (MSTI). However, in 2001, there was a significant realignment, wherein the responsibility for overseeing e-government initiatives transitioned to the Ministry of Finance (MoF). This shift involved the establishment of a dedicated Joint E-Government Board and Digital Task Force within the MoF. The objective behind this restructuring was to develop a distinct and focused e-government strategy, separate from the broader information society strategies that had previously encompassed e-government under the former ministry's mandate [44].

Denmark has consistently been a global leader in e-government services and infrastructure for two decades. The country's national digital infrastructure includes key enablers such as the CPR personal registration number, NemID secure personal authentication, Digital Post secure two-way communication, NemLogin public authentication system, and NemKonto unified bank account registry. These foundational components have played a pivotal role in

positioning Denmark at the forefront of e-government capabilities and online public services for an extended period. The robust national digital infrastructure, bolstered by initiatives like NemID and Digital Post, has been instrumental in Denmark's sustained success in e-government compared to the majority of nations [45].

In addition, various public portals offering reliable information, transactional services, and access to personal data were developed around 2010. These portals, including healthcare (Sundhed.dk), taxes (Skat.dk), business (Virk.dk), and citizen services (Borger.dk), have gained widespread recognition and usage among citizens and businesses [46]. Launched 20 years ago, these portals have seamlessly integrated into the daily routines of citizens and businesses, with approximately 90% of high-frequency, high-volume services now being requested and delivered online [47]. The evolution and widespread adoption of these public portals over the past two decades has been instrumental in enabling Denmark to achieve remarkable levels of e-government and online public service delivery.

Therefore, the Danish government has pursued a series of digital strategies, starting with the Info-Society 2000 initiative, which outlined the initial vision for an information society in 1994[48]. Subsequently, five additional strategies were implemented, as detailed in Table 3. The first e-government policy from 2001 to 2004 focused on "e-Gov: Vision and Strategy for the Public Sector in Denmark," with digital communication as a primary goal [49]. Its three priorities included the implementation of digital signatures, mandating government institutions to receive emails from businesses and citizens, and enabling inter-organizational digital communication [49]. The second policy, "Realizing the Potential," from 2004 to 2006, aimed to enhance efficiency and digitization in public organizations. Its three priorities involved introducing the NemKonto single bank account system and eInvoice electronic invoicing, deploying various portals, and facilitating secure communication across public administration [50].

The third policy, "Towards Better Digital Service, Increased Efficiency and Stronger Collaboration," spanning from 2007 to 2010, focused on constructing common infrastructure. Priorities included implementing the more secure NemID and NemLogin personal authentication, electronic tax payments, and mandating the use of shared infrastructure by public institutions [15]. The fourth policy, "Digital Path to Future Welfare," covering 2011 to 2015, targeted digital communication and service delivery. Its four priorities were compulsory Digital Post use, mandatory online self-service for citizens and businesses, improving digital welfare, and foundational data programs [47]. The fifth policy, "A Stronger and More Secure Digital Denmark," from 2016 to 2020, aimed to enhance usability, foster economic growth, and strengthen security. Priorities included data reuse, a common public digital architecture, private sector collaboration, and improved data protection and cybersecurity [51]. Following the pandemic, a new strategy for 2022 is planned. These modernization and digitization strategies garnered broad political support in Denmark, featuring clear priorities and cross-sectoral cooperation models.

Furthermore, Denmark has established a supportive e-government infrastructure focused on key elements such as data sharing, a shared information society vision, privacy protection, and open government, all while upholding core Danish values. The government is dedicated to utilizing e-government to revolutionize public service delivery, ensuring both quality and heightened efficiency [52]. As a result, the trust of civil society is deemed crucial, facilitating the government's strategic planning and the effective implementation of e-government and administrative reforms. Conversely, a loss of confidence among citizens in e-government services could lead to a decline in usage, rendering e-systems ineffective without public adoption [53]. Denmark acknowledges that the success of e-government requires infrastructure and policies that align with societal values, in addition to maintaining sustained public trust and engagement. Lack of either the proper infrastructure framework or active citizen confidence poses a risk to the failure of e-government initiatives.

As highlighted by the UN's E-Government assessments, Denmark is recognized as a global leader in e-government implementation, consistently ranking among the top ten countries due to its strong technology infrastructure, skilled human capital, and rich social history [51]. Consequently, the experience of Denmark in e-government can offer valuable lessons for developing nations. Nordic countries, particularly Denmark, have consistently achieved high rankings in global e-government assessments over the past decade, with Denmark maintaining a position in the top ten for its e-government systems across various UN reports [54].

Since, Scandinavian countries consistently secure top positions in global rankings of democracy and transparency, fostering a high degree of public trust. The European Social Survey (ESS) consistently indicates that trust in political institutions among Nordic citizens significantly exceeds that of their European counterparts.

Denmark, followed by Norway, Finland, and Switzerland, consistently ranks among the nations with the highest levels of trust and transparency, also being among the least corrupt worldwide [55]. Denmark's elevated levels of democracy, transparency, and low corruption contribute to cultivating citizen trust, a crucial factor supporting its successful e-government development.

Table 3. Danish government digital strategies development

Year	Main Objective	Priorities
1994-2000	Digital as central strategy	- Various systems, standards - Infrastructure and skills
2001-2004	Digital communication	- Digital signature - Compulsory to receive digital mails from citizens - Inter-org. comm.
2004-2006	Digitization within public organizations	- Digital transactions - Portals - Secure communication
2007-2010	Common infrastructure	- Secure ID, eTax - Mandatory digital use of public institutions
2011-2015	Digital communication	- Mandatory Digital Post - Mandatory self-service - Digital welfare - Basic data
2016-2020	Stronger and more secure digital communication	- Data reuse - Common architecture - Inter-collaboration - Data protection & security

6. Discussion

Developing countries express a strong desire to implement e-government systems within their nations. The research, as illustrated in Table 4 below, identifies seven key factors derived from the literature that encompass crucial aspects of e-government adoption. These factors include national vision and strategy, ICT infrastructure, laws and public policy, education and literacy, trust and privacy, stability and security, and transparency and corruption. A comparison between developed countries such as Denmark and developing countries like Iraq reveals gaps in these areas that significantly impact e-government success. For instance, Denmark is likely to possess a clearer national roadmap and defined objectives compared to Iraq. Denmark also boasts more advanced ICT systems and infrastructure, providing a foundation for digitizing services. Moreover, developed countries often have more progressive laws and policies that support the implementation of e-government services. Higher education and literacy rates in developed nations, such as Denmark, contribute to increased citizen engagement with e-government services.

In contrast, developing countries frequently score lower in citizen trust and perceived privacy. Security and stability issues may also pose hindrances to e-government implementation in developing contexts. Finally, higher levels of corruption and a lack of transparency in government processes can impede the adoption of e-government. This comparative analysis of the seven factors helps identify the strengths and weaknesses influencing a country's capacity to implement e-government effectively. The disparities outlined in this comparison shed light on why e-government adoption tends to lag in developing nations compared to more developed countries like Denmark.

The e-government initiatives in Denmark and Iraq highlight the critical role of information systems and information technology in enabling and driving digital transformation in the public sector. While the two countries have vastly different contexts, the technical aspects of their e-government implementations deserve closer examination. Hence, key distinctions in e-government adoption between Iraq as a developing country and Denmark as a developed country have been elucidated. Nevertheless, the implementation of e-government systems encounters substantial barriers and challenges across various contexts. Significant disparities persist between the e-government capabilities of developing nations and their developed counterparts. This research sought to explain aspects of Iraq's e-government initiative, representing a developing country, in comparison to Denmark's more advanced system, highlighting the respective obstacles each face. The success of e-government services depends heavily on user experience and human-computer interaction considerations. Denmark's e-government portals have been designed with a strong focus on usability, accessibility, and intuitive interfaces, resulting in high user satisfaction and adoption rates. Iraq's e-government platforms may benefit from integrating user experience and human-computer interaction best practices to improve citizen engagement and enhance the overall user experience.

Therefore, the objective was to underscore the differences between these two nations, offering insights that can inform Iraq's own e-government development through lessons drawn from successful developed nations like Denmark. The literature review provided a comprehensive background on e-government adoption in both developing and developed contexts, covering critical factors such as cultural, political, social, technical, and administrative dimensions. Despite advancements, developing countries, in particular, continue to grapple with e-government implementation. Recognizing the strengths inherent in developed e-government programs can

Table 4. E-government comparison in Iraq and Denmark

Category	E-government in Iraq	E-government in Denmark
Vision and Strategy	• So far, the Iraqi government has not established a definitive vision or strategy for developing and implementing an e-government system in Iraq.	• Denmark has consistently upheld a vision and strategy for embracing e-government since the 1990s.
ICT Infrastructure	• Iraq has poor existing infrastructure and low internet access for citizens and government employees. • Communication infrastructure is also inadequate, along with unreliable electricity supply.	• Denmark has robust existing infrastructure and high internet access for citizens and government employees. • Strong infrastructure such as ICT tools, technical expertise, human resources systems, and a supportive social history.
Law and Public Policy	• Iraq lacks specific laws regulating and enabling the government's adoption of information and communication technologies (ICT). • The absence of dedicated laws in this area can create legal or policy barriers for e-government initiatives. • Currently, there is no law in Iraq that specifically addresses e-government and related areas such as digital services, data sharing, or online transactions.	• The primary Danish law regulating e-government is the consolidated Act No. 128, also known as the Tele Act, passed on February 7, 2014. • The Act expanded the scope of institutions, public-private entities, and corporations covered under the legislation. • The Tele Act serves as Denmark's main legal foundation for continued e-government development and open data initiatives.
Education and Illiteracy	• As of 2023, 74.9% of the population in Iraq are internet users and the literacy rate is 79.7%. • Due to low internet literacy levels in Iraq, many people do not view e-government as a high priority. • There is limited public awareness and knowledge about e-government in Iraq. • The relatively low literacy rates present challenges for widespread adoption of e-government services	• As of 2022, approximately 95% of the population in Denmark are internet users and the literacy rate of is 99%. • Denmark has very high internet usage and literacy rates compared to many other countries. • The widespread internet access and near-universal literacy in Denmark create favorable conditions for the adoption and utilization of e-government services among the population.
Trust, Privacy, and Confidence	• There is low trust in e-government among Iraqi citizens due to concerns over the security and effectiveness of online services. • Without public confidence and trust, e-governance initiatives in Iraq will fail to achieve meaningful adoption by citizens. • Restoring public trust is essential for Iraqi officials to successfully digitize bureaucracies and harness the benefits of e-government technology.	• The high levels of political trust and confidence in institutions in certain European countries, especially Denmark, Norway, Finland, and Switzerland. • High-trust societies like Denmark could help identify the drivers behind strong confidence in government bureaucracies. • Examining the variations in trust levels may uncover policies and factors that can bolster public faith in government and enhance democratic accountability across the region.
Countries' Stability and Security	• Security issues and political instability in Iraq have obstructed further development and implementation of e-government initiatives. • Iraq lacks cybersecurity readiness and advancing a comprehensive e-government framework remains challenging until digital infrastructure is secured. • Iraq's experience demonstrates the interdependence of political, economic, and technological progress need resolution to enable digital transformation and leverage e-services for growth.	• Denmark has become the most cyber-secure in the world due to its strong cybersecurity measures. • Effective policies like regulations and nationwide cybersecurity education have strengthened Denmark's cyber defenses and resilience. • Denmark's cybersecurity model offers lessons in building resilience through measures such as integrating cyber-hygiene across society and infrastructure, user awareness, emergency planning, and talent development.
Corruption and Lack of Transparency	• Corruption, lack of transparency, and cronyism are prevalent issues in many developing nations, leading to an unfair system benefiting. • Combating corruption requires a multi-pronged approach involving governance reforms for transparency, accountability, oversight, and consequences.	• Denmark, have very low levels of corruption due to strong anti-corruption policies and governance focused on curbing cronyism and abuse of power. • Key factors enabling the Denmark model success against corruption include openness, intolerance of graft, proactive policies, and an engaged civil society.

inform strategies for optimizing success by adapting best practices to the unique context of the developing world. Further research is essential to continue narrowing the global e-government gap. Each country presents distinctive circumstances and requirements in the realm of e-government adoption. Merely replicating systems from developed countries without adaptation is neither realistic nor beneficial for developing nations.

Nonetheless, there are valuable lessons that developing countries can glean from the experiences of others. Each nation formulates its own vision, plans, and strategies for e-government based on its specific circumstances. This study has identified several common obstacles encountered across different contexts in the implementation of e-government systems, irrespective of whether the country is developed or developing. The widespread adoption of e-government initiatives faces numerous challenges, including the absence of a clear vision and strategy, inadequate ICT infrastructure, legal and policy impediments,limited awareness among stakeholders, poor management practices, resource constraints, human resource shortages, and policy inconsistencies. Denmark's advanced e-government program serves as an exemplary model from which other nations can draw insights, adapting these lessons to suit their own requirements. While e-government progress exhibits variation globally, sharing knowledge of best practices and challenges can facilitate swifter, context-specific advancements. Through collaborative learning, countries at various stages of e-government implementation can pursue improvements that align with their unique needs and capabilities.

This research conducted a comparative analysis between Iraq and Denmark across several critical areas. Firstly, concerning vision and strategy, Iraq currently lacks a clear e-government plan and roadmap, with limited efforts by the government and parliament in developing and executing e-government systems. In contrast, Denmark has established short and long-term visions and strategies for e-government, receiving robust support from both the government and parliament. Regarding ICT infrastructure, Denmark boasts a robust history of continuous investment in upgrading systems and expanding access, while Iraq's ICT infrastructure has deteriorated due to years of conflict, resulting in slow and unreliable internet service. Another notable gap is that Iraq has not enacted specific laws and policies to enable e-government services, unlike Denmark. In summary, Iraq is still in the early stages of e-government readiness, while Denmark has made it an urgent policy priority with proper infrastructure, laws, and governance strategy. While contexts differ, Iraq could benefit from emulating some of the vision, leadership, and systemic conditions that have enabled Denmark's successful e-government adoption.

Additionally, Iraq faces challenges with low rates of digital literacy and ICT skills among citizens, posing a barrier to e-government adoption compared to Denmark's tech-savvy population. Countries with high digital literacy can implement e-government more rapidly. Furthermore, corruption in Iraq has eroded public trust in the government. Even if Iraq were to create advanced e-government systems, usage and participation would be hindered by a lack of trust.

Comparatively, Denmark has established greater citizen trust and worked to tackle corruption. Therefore, as Iraq pursues e-government initiatives, it must focus on digital literacy programs and anti-corruption measures to build public confidence. This research proposes recommendations for Iraq to develop its e-government capabilities by learning from successful models in developed countries like Denmark. Strategic adoption of leading practices while addressing Iraq's unique challenges and context could pave the way for improved e-government implementation. With adaptable roadmaps and policies, developing countries can gain benefits from developed nations' e-government experience.

7. Conclusion

E-government has emerged as a significant force in recent years, reshaping public administration and governance practices on a global scale. This research conducted a comparative analysis of e-government systems, highlighting the differences between Iraq, representing a developing nation, and Denmark, a developed country. Despite the significant disparities in e-government capabilities between these developing and developed economies, the study aimed to provide insights into the varying levels of implementation and effectiveness, there are valuable lessons that developing countries can draw from the experiences of more advanced e-government programs. The main aim of this research was to identify the shortcomings in e-government development in developing countries compared to developed nations. The successful implementation of e-government is closely tied to various crucial factors, including social, cultural, political, legal, and religious aspects. This study offered a detailed comparison between Iraq and Denmark, focusing on seven key areas: vision and

strategy, ICT infrastructure, laws and policies, education and literacy, trust and privacy, stability and security, and transparency and corruption. It emphasized the importance of systematically considering and addressing these influential factors. Each developing country can leverage this work to gain insights from the lessons learned by developed nations in the realm of e-government, particularly those facing similar challenges in the highlighted areas. With the strategic use of global knowledge, developing countries can make progress in overcoming barriers to effective e-government implementation tailored to their unique contexts.

Hence, This study has several limitations. One notable limitation is that the scope was confined to four databases, which means that other pertinent literature might not have been identified. Future researchers could use snowball sampling to incorporate a broader range of literature. Additionally, this systematic review consisted of studies published only in English. However, it is important to consider reviewing articles in other languages as well. The possibility exists that some valuable research may have been overlooked due to publication in languages other than English.. Additionally, researchers used terms for this systematic review of articles was limited to factors that identified. But other terms may also be used for future research in e-government implementation in developing and developed countries.

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