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E-Government Progress in Emerging Nations: Insights from Developing Countries

Sherajum Munira[1*] Achmad Nurmandi[2] ¸ Eko Priyo Purnomo[2], Faris Al-Fadhat[3]

[1] Doctoral program of Government Affairs and Administration, Universitas Muhammadiyah Yogyakarta, Bantul, Indonesia.

[2] Department of Government Affairs and Administration, Universitas Muhammadiyah Yogyakarta, Bantul, Indonesia.

[3] Department of International Relations, Universitas Muhammadiyah Yogyakarta, Bantul, Indonesia.

ARTICLE INFO	ABSTRACT
	E-government, which stands to benefit from ICT, offers the chance to improve public services. ICT has been successfully incorporated into several nations' governing structures, like China, South Korea. Many other nations, particularly those in the developing world, are still struggling to create stronger governance systems because they have not yet successfully incorporated ICT into their governance frameworks. This study contributes by conducting a comparative study on the Bangladesh-Indonesia's current e-government progress. Both countries transferring to digital systems and attempting to establish an electronic government. The E-Government Development Index (EGDI) reports and rankings from the United Nations are the focus of this research. Our study's results demonstrate that, Bangladesh and Indonesia have significantly improved its ranking from 2008 to 2022. In order to facilitate e-governance and support improved online services, progress in human development, and telecommunication infrastructure, Bangladesh and Indonesia require an improve and more advance e-government model in terms of administration, facilitation, and participation.

1.Introduction

The importance of information and communication technology (ICT) has grown dramatically in the age of social revolution. The accessibility of governmental services has increased with the incorporation of ICT into the government structure. Governments all over the globe are continuously implementing e-government through the use of ICT as one element of digital inclusion because they have recognized the advantages of e-government in improving their nations (Akkaya, Wolf, & Krcmar, 2010; Gichoya, 2005). [1]

Sherajum Munira
E-mail address: s.munira.psc23@mail.umy.ac.id
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E-governance has become a powerful instrument that the government may use to enhance quality of public sector service and deliver customer-focused public services. E-governance has had a significant impact on reducing corruption, promoting transparency, improving efficacy, boosting GDP growth, and increasing effectiveness (Ervural, 2023; Khan et al., 2022). It raises the level of direct citizen engagement in national government. Additionally, e-government services enhance the government system by using ICT to simply, affordably, and effectively provide citizens with information and public services (Aritonang, 2017).

The term "e-government," according to Norris (2010), refers to the integration of external information technology applications into a wide range of government processes, including contacts with citizens, businesses, and other government agencies. Online access to public records and services is a common way that people think of "e-government" (Androniceanu, Georgescu, & Sabie, 2022).

Korea is one of the best-performing OECD nations when it comes to e-government. It has attained and retained the top spot in the world's e-government rankings (Turner et al., 2022). China is yet another example. China has made extensive use of e-government, which has aided in maintaining excellent governance in the nation (Atique et al., 2024). China's successful e-government implementation relies on widespread internet adoption, online services, and easy access to public services, while cultural value and personal interests enhance citizen usage (Guo, 2024).

Developing countries' adoption of e-government is still in stages of development, and several of these nations have had limited success. This could be partially caused by the complexity of each nation, resource scarcity, sociocultural issues, and other difficulties (Wireko & Skouby, 2016). In developing nations, they may also entail increased public empowerment through information availability. The previously mentioned factors may encompass enhanced citizen empowerment via information accessibility, improved government administration, less corruption, heightened transparency, and decreased expenses (Thorpe & Pokhrel, 2024).

Bangladesh and Indonesia are middle-income countries in Asia. Both countries have positive economic growth and development. Bangladesh and Indonesia have planned the growth of e-government and implemented it in several online public service platforms (Al Mamun et, al., 2022; Putri, 2022). Indonesia was ranked from 106 in 2008 and substantially advanced to 77 in 2022 out of 193 countries and Bangladesh was ranked 142 in 2008 and substantially advanced to 111 in 2022 in the UN Survey for E-Government Development Index (EGDI). The EDGI is a composite index that combines a number of indicators to demonstrate how eager and able a nation's governments are to use ICTs to provide public services(Turner, Kim, & Kwon, 2022b)

The purpose of this study is to offer a comparative analysis between Bangladesh and Indonesia to identify what are the key challenges of E-governance for Bangladesh and Indonesia. The study also identifies the differences and similarities in implementation of e-governance policies between Bangladesh and Indonesia. It will establish a comparative analysis framework based on key elements that influence the growth of e-government, such as government regulations, infrastructure, digital literacy, public participation, delivery of services, and laws and regulations. This framework will be developed.

2.Literature review

Research of the successes and failures of e-government initiatives in nations like Indonesia and Bangladesh has gained momentum in recent years. Concepts from the literature on e-government research are used to build an understanding. The term "e-governance" is being discussed in a number of nations. We also cover the e-government implications and progress in numerous nations, including Bangladesh and Indonesia, in this section.

2.1 The concept of e-governance

To deliver government services, exchange information, and communicate with individuals, businesses, and other government organizations, E-Government, often called electronic government, makes use of information and communication technologies (ICTs). The concept of electronic government, or "e-government," is a part of the government system that uses technology to make information and services more accessible to the public. It also improves communication between the government and its constituents, lays the groundwork for electronic democracy, and encourages efficiency, effectiveness, and transparency (Cloete, 2007; Wirtz et al., 2015). E-governance aims to reduce corruption, increase productivity, and provide efficient, fair, transparent, and accountable services and goods, aligning with good governance principles and the rule of law (Lan, 2004).

According to Siar (2005), highlighting six functions of e-governance, including community knowledge, improved accessibility of government services, transparency, accountability, and participation in decision-making. It also facilitates communication collaboration between government, people, and civil society, and enhances administrative system efficiency (Siar, 2005). Wirtz and Daiser (2015) describe e-government as the electronic management of democratic processes and public administration using ICT. Internet, citizens, info, and services. Computers and the web are fundamental to e-government (Wirtz et al., 2015).

In 2018, the United Nation Survey on electronic governance highlights e-government's role in achieving sustainable development goals and promoting resilience through ICTs. However, integrating e-governance into governance systems is complex and requires further investigation for effective implementation (Atique et al., 2024).

2.2 E-government in Bangladesh and Indonesia

At the start of the twenty-first century, Bangladesh and Indonesia, like all other nations, acknowledge the significance of e-governance. In an effort to make significant strides toward e-government, the Government of Bangladesh (GoB) launched the Rajshahi City Corporation e-birth registration project in 2001(Ahmad, 2021).

The government of the Bangladesh created its first comprehensive information and communications technology (ICT) policy in 2002, when it became aware of the necessity to implement contemporary technologies in order to improve the effectiveness and availability of its public services(Al Mamun et al., 2022). This event signified the beginning of Bangladesh's road towards implementing an e-government. In the years that followed, the essential infrastructure construction and the enhancement of service delivery would continue. E-government has taken on greater importance since the year 2009, when Digital Bangladesh was first introduced to the public (Siddiquee, 2016).

Egger et al. (2021) provides statistical evidence of declining living conditions in nine developing nations, including Bangladesh, during the COVID-19 crisis. This study, although not directly linked to e-government, highlights the significance of digital infrastructure and government services, particularly in times of crisis when face-to-face services may be restricted (Egger et al., 2021).

In their 2016 study, Bolívar et, al., examined the advancements and growth of e-government in Bangladesh from 2000 to 2012. The study provided useful insights into the development of e-government research and emphasized the growing fascination in this field. However, the specific challenges of e-government adoption in Bangladesh were addressed by Gregor, Ahmed, and Turner (2014), who proposed a 'sweet spot' change strategy for leveraging e-Government in the country.

The study conducted by Schmidthuber et al. (2017) examined the development of local open government and the factors that influence citizen participation in reporting online services. This study elucidated the significance of citizen engagement and participation in the triumph of e-government efforts. Moreover, Sarker et. al., (2020) examined the economic feasibility and determinants of biogas technology adoption in Bangladesh. While not directly related to e-government, this study highlighted the significance of economic factors and determinants of technology adoption, which can be extended to the context of e-government.

Batubara and Janssen (2018) conducted a systematic literature review to examine the difficulties associated with the implementation of blockchain technology in e-government. Although the study did not directly target Bangladesh, its findings have significant implications for the implementation of new technologies in the context of e-government in the country. Understanding the potential barriers and enablers of blockchain technology adoption can provide valuable insights for policymakers and practitioners in Bangladesh.

Bair, Anner, and Blasi (2020) investigated the political economics of both private and state regulation in Bangladesh after the Rana Plaza incident. This study emphasized the intricate interaction between political and regulatory elements in influencing the socio-economic environment of Bangladesh, even though it is not directly connected to e-government. Understanding the broader political and regulatory context is crucial for the successful implementation of e-government initiatives.

In order to meet the needs of the nation's growing population, e-governance is putting cutting-edge technological solutions into the agriculture sector to boost food production and guarantee food security in the twenty-first century (Sheikh & Berenyi, 2023). According to Kant et al. (2016), e-governance efforts provide agronomy information management (AIM), or e-agriculture services. The implementation of e-agricultural has the potential to yield substantial benefits for Bangladesh's agriculture sector (Rashid & Islam, 2016).

Indonesia's e-Government implementation began in 2001 (Putri, 2022), benefiting both government institutions and the public through various types of communication, focusing on public services and good governance. A multitude of variables, including funding, leadership, ICT and human resource capabilities, and tools and resources, affected the adoption of e-government (Pribadi, 2023).

During the early phases of e-Government deployment in Indonesia, official websites for news, legislation, and information were created by regional governments. Additionally, some

websites include interactive tools for group communication. In 2013, the majority of Indonesia's provinces and municipalities have official websites (Faiz & Faiza, 2017).

The Ministry of Communication and Informatics developed several e-Government initiatives in 2011, such as Integration and Data Exchange Management (MANTRA), Cyber Office Administration (siMAYA), Civil Servants Mail (PNSMail), and Private Network Security Box (PNSBox) (Faiz & Faiza, 2017).

In their study, Witarsyah et al. (2017) put out a conceptual framework aimed at identifying the key elements that have a significant impact on the adoption of e-government in Indonesia. The study emphasized the significance of elements such as infrastructure, government backing, and public readiness in shaping the uptake of e-government services. This discovery implies that a holistic approach that takes into account both technical and non-technical elements is crucial for the effective adoption of e-government in Indonesia (Witarsyah et, al., 2017)

Aji, Berakon, and Husin (2020) performed a multigroup analysis to investigate the willingness to utilize e-wallets in Indonesia. The study discovered that variables such as perceived usefulness, perceived simplicity of use, and social influence had a substantial impact on the intention to utilize e-wallets. These findings are important for understanding the factors that drive digital payment adoption, which is a crucial component of e-government services (Aji et, al., 2020).

Indonesia implements e-government initiatives, such as electronic invoicing and electronic forms. E-billing refers to the electronic payment of taxes using a billing code. Online tax payments can be made using a billing code, similar to how payments are made through banks or postal services. The Indonesian government has many obstacles in the implementation of e-government, such as insufficient public knowledge regarding the advantages of utilizing e-government, inadequate IT infrastructure, and a dearth of suitable education and training opportunities (Rokhman et al., 2023).

The socio-economic and infrastructure issues that are specific to least and middle developed countries like Bangladesh and Indonesia were the focus of this approach, which attempted to overcome those challenges once and for all.

2.3 Theoretical background

2.3.1 Innovation ecosystem benefit and function, definition and support

In the framework of a focus on competitiveness, the idea of innovation systems was initially presented. Since then, it has evolved into a dynamic approach to the concept of global competence. Regional innovation systems (RIS) have been implemented in the examination of innovation processes within intricate systems. The majority of research in this area focuses on performance and competitiveness, with an increased significance placed on collective activities associated with networks, institutions, and social interactions (Asheim, Smith, & Oughton, 2011).

The link between innovation and regional competitive advantage is offset by the establishment of regional competitive advantage through RIS. Fritsch and Stephan (2005) conducted a study on the efficacy of regional innovation systems, specifically examining the positive impacts of sectoral specialization and population density (Fritsch & Stephan, 2005).

The innovation ecosystem, introduced by the President's Council of Advisors on Science and Technology in 2003, aims to create a technology-led nation through various drivers including innovative research institutions and universities (Reynolds & Uygun, 2018).

Innovation ecosystems are widely recognized as crucial catalysts for fostering innovation at both the national and regional levels. Moreover, the struggle among nations is slowly shifting towards competition among innovation ecosystems (Xie & Wang, 2020).

3. Methodology

This study uses qualitative research with a comparative analysis approach. The researcher both countries due to Bangladesh and Indonesia are developing populous countries with diverse socio-economic backgrounds. Bangladesh, with its rapid urbanization and growing middle class, presents a unique landscape for E-government initiatives. Indonesia, on the other hand, with its vast archipelago and diverse cultures, faces challenges of connectivity and inclusivity in implementing digital governance.

The researcher employs the secondary data collection method. An examination of sustainable metrics from 2008 to 2022 has been conducted to compare Bangladesh and Indonesia. For this comparison study, data has been obtained from two sources: (1) The UN 2022 E-government survey report includes several indicators, namely the E-government Development Index (EDGI) ranking, the Human Capital Index (HCI), the Online Service Index (OSI), and the Telecommunication Infrastructure Index (TII).

The EGDI assesses the e-government plans, strategies, and national websites. Additionally, it quantifies and compares the e-government efforts of different countries, using a weighted average of normalized scores for three components. (OSI, TII, and HCI) (Atique et al., 2024).

4. Results and discussion

This study conducts a comparative analysis of Bangladesh and Indonesia's e-government progress using the United Nations' E-Government Development Index (EGDI) reports from 2008 to 2022. The EGDI evaluates countries based on three dimensions: online services, telecommunications infrastructure, and human capital.

4.1 Study findings

The Table 1 shows the comparison of the progress in digitalization and e-government development in Bangladesh and Indonesia4.2(Table.1)

Year	Bangladesh		Indonesia	
	EGDI (Value)	Rank	EGDI (Value)	Rank
2022	0.5630	111	0.7160	77
2020	0.5189	119	0.6612	88
2018	0.4862	115	0.5258	107
2016	0.3800	124	0.4478	116
2014	0.2757	148	0.4487	106
2012	0.2991	150	0.4949	97
2010	0.3028	134	0.4026	109
2008	0.2936	142	0.4107	106
2005	0.1762	162	0.3819	96

| 2004 | 0.1788 | 159 | 0.3909 | 85 |
| 2003 | 0.1654 | 159 | 0.4224 | 70 |

Table 1. Digitalization and e-government in Bangladesh and Indonesia: a comparison (2003–2022)

Source: United Nations database

The E-government Development Index (EGDI) elevates ICT to a more prominent position in conversations about development and the government's goal to use ICT for public service delivery. The EGDI assesses a nation's ICT infrastructure, quality, and capacity to leverage ICT for economic gain (Seo & Hasan, 2015)

As previously said, it is a comprehensive indicator of user capability. The EGDI measures and ranks three performance dimensions: the Online Service Index (OSI), the Telecommunication Infrastructure Index (TII), and the Human Capital Index (HCI). The rankings have shown to be beneficial and have significantly accelerated the progress of e-Government programs (Dahalin et al., 2019).

Initiatives for e-governance are being implemented in Bangladesh and Indonesia to increase citizen interaction with the digital world. These include posting all pertinent information online and enabling businesses and individuals to use services without having to speak with employees directly (Alam et al., 2023; Rokhman et al., 2023)

Figure 2 shows Bangladesh, and Indonesia E-Governance Development Index Comparison. Figure 2 shows that Bangladesh, and Indonesia's EGDI ranking has increased respectively from 142ⁿᵈ in 2008 to 111ᵗʰ in 2022 and 106ᵗʰ in 2008 to 77 in 2022. (Figure1)

Figure 1. below showing Indonesia and Bangladesh EDGI comparison

Source: United Nations database
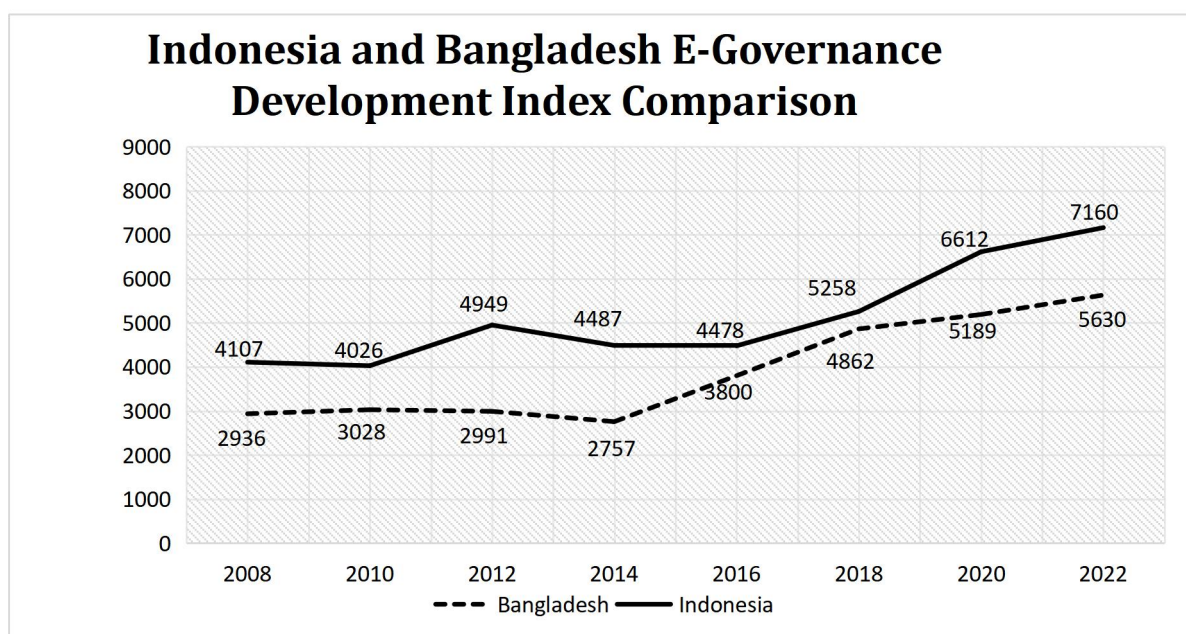
The EGDI value of Bangladesh was 0.2991 and 0.2757 in 2012 and 2014, respectively. These values are a little lower than before. The EGDI value of Bangladesh grew steadily from 2016 to 2022. Bangladesh succeeded in 2016 as a result of a shift in government policy and the availability of adequate funding for such a comprehensive undertaking. But more may be done to improve the situation by establishing e-government in Bangladesh through appropriate long-term planning, human resource development, political unity, and ICT adoption (Seo & Hasan, 2015).

However, the EGDI value of Indonesia was 0.4949, 0.4487 and 0.4478 in 2012, 2014 and 2016, respectively. In 2014 and 2016, the value of Indonesia was little lower than 2012. From 2018 to 2022, the e-government ranking of Indonesia has increased. From 2018, in Indonesia, the implementation of enactment of Presidential Decree 95/2018 on Electronic-Based Government Systems (SPBE). Consequently, all regional governments are striving to adopt e-Gov initiatives, in line with the principles outlined in Presidential Regulation 95/2018, which has a substantial impact on improving the EGDI ranking (Muzaqqi et, al., 2023).

Based on the results, the implementation of e-government has a positive and significant effect on Bangladesh and Indonesia's EGDI ranking. That is, these countries have maintained and are continuously working to improve their e-government systems.

In recent years, Bangladesh and Indonesia have been actively endeavoring to enhance their e-governance systems. Nevertheless, there exist distinct disparities in their advancement and growth. Indonesia's government has released Presidential Decree Number 95/2018 on the implementation of an E-Government System. This decree emphasizes the utilization of information and technology to promote effective administration and enhance the standard of public services. The implementation of e-government applications such as e-billing (Chomistriana et, al., 2024) exerts a favorable and substantial impact on the rating of EGDI.

In 2018 Bangladesh has made significant improvement in Online Service Index (OSI) (Fig. 3). Bangladesh saw improvement from 0.6232 value in 2016 to 0.7847 value in 2018 but then declined OSI value.

It is a significant e-government effort that the government of Bangladesh is rapidly moving its public services via the internet in recent years (Chowdhury et, al., 2020). E-Tax service, Mobile Finance Service (MFS), online travel agency is an emerging e-government service in Bangladesh (Mollik et al., 2024; Rifat et al., 2019) which has effect on increase EGDI ranking.

Since 2018 Indonesia has made improvement in Online Service Index (OSI) and then scores continue to grow OSI value. The OSI's performance has been declining since 2010, dropping from 16th position in 2010 to 20th in 2012, 33rd in 2014, and most recently down to 42nd in 2016 (Dahalin et al., 2019). (Figure)

**Figure 2.** Bangladesh and Indonesia online service index comparison
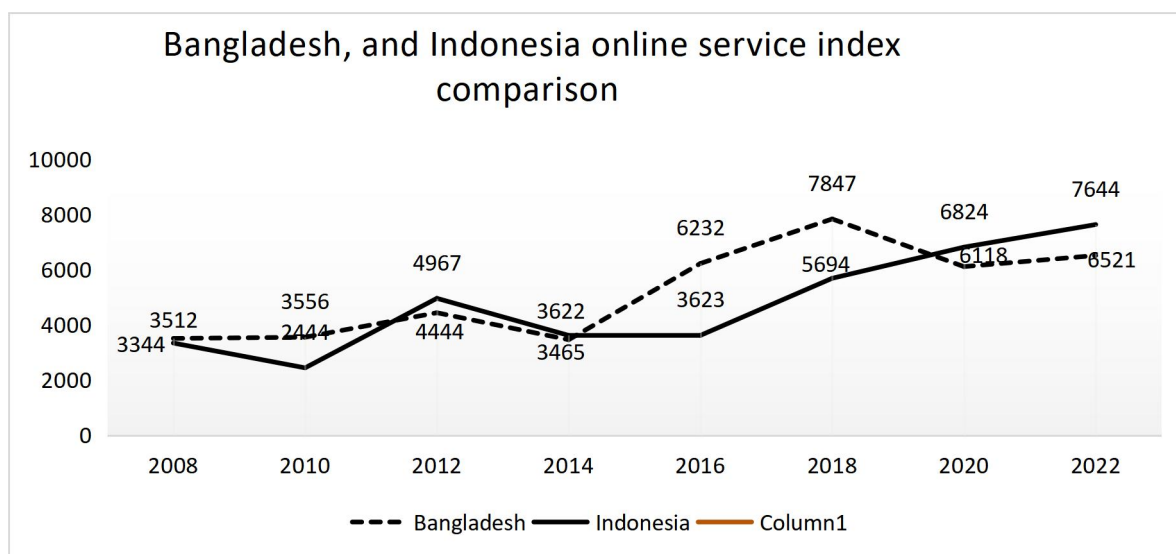
Source: United Nations database

Human capital refers to the human resources that support and develop the capabilities of individuals, organizations, and governments in areas such as ICT, technology, and human resource management that are required for e-government development (Thorpe & Pokhrel, 2024)**.**

Figure 4 illustrates that, since 2008, Indonesia has outperformed Bangladesh in terms of the Human Capital Index (HCI). Bangladesh had an HCI value of 0.590 in 2022, compared to Indonesia's 0.743. Even though Indonesia is valued more than Bangladesh, both nations struggle with a lack of human capital, which is a significant e-Government challenge (Siddiquee, 2016; Thorpe & Pokhrel, 2024).

One important aspect supporting the development of ICT and e-government services is human capital (Magoutas et,al., 2024). Bangladesh and Indonesia have poor levels of digital literacy, as indicated by their low EGDI Human Capital Index values. It indicates that people are not able to use ICT. The ability to access web services is poor among the rural people. Bangladesh and Indonesia may not be able to create and implement E-Government initiatives due to a lack of trained professionals (Siddiquee, 2016; Thorpe & Pokhrel, 2024).

**Figure 3.** Bangladesh, and Indonesia Human Capital Index comparison
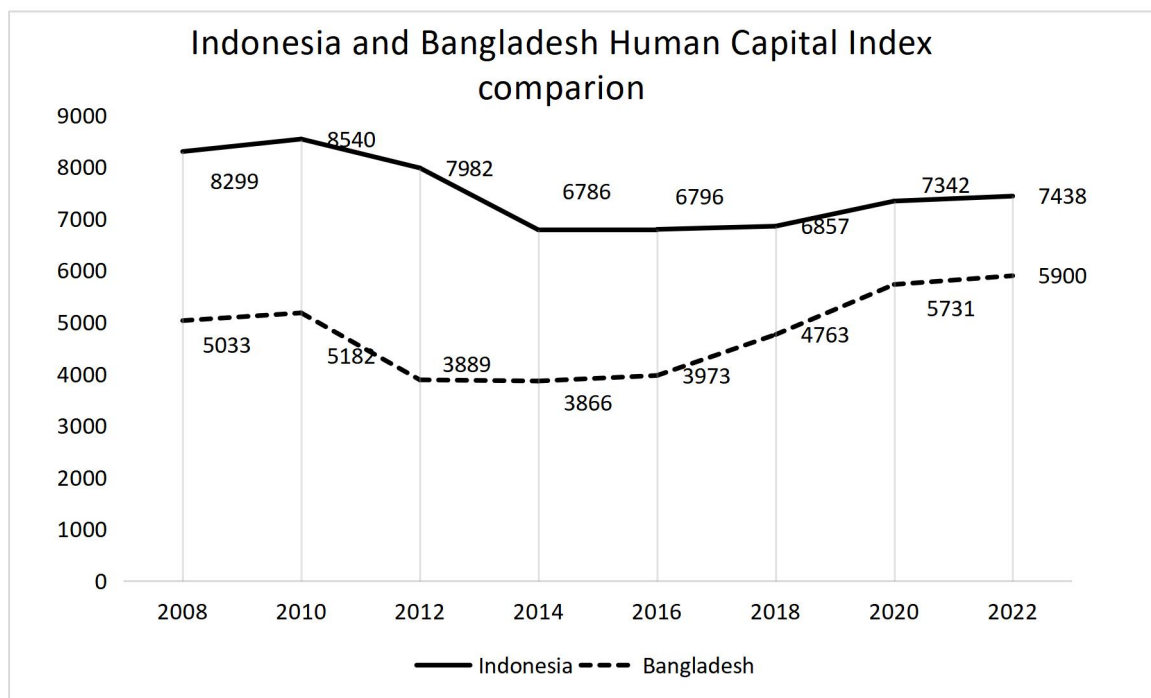
Source: United Nations database

A comparison of Bangladesh and Indonesia's telecommunication infrastructure reveals that both countries have made development towards E-governance for the last two decades. Fig. 5 below shows, Indonesia has consistently scored higher than Bangladesh on the TII since 2008 and have seen fluctuations over time.

Compared with Indonesia, Bangladesh's investment in e-government infrastructure, internet accessibility, digital literacy programs are higher than Indonesia. Bangladesh and Indonesia require an improved and contemporary e-government framework that focuses on effective administration, facilitation, and participation. This framework should guarantee enhanced online services, human development, and communications infrastructure to support the countries' development through the facilitation of e-governance.

Figure 4. Bangladesh, and Indonesia Telecommunication infrastructure index comparison

Bangladesh, and Indonesia Telecommunication infrastructure index comparison
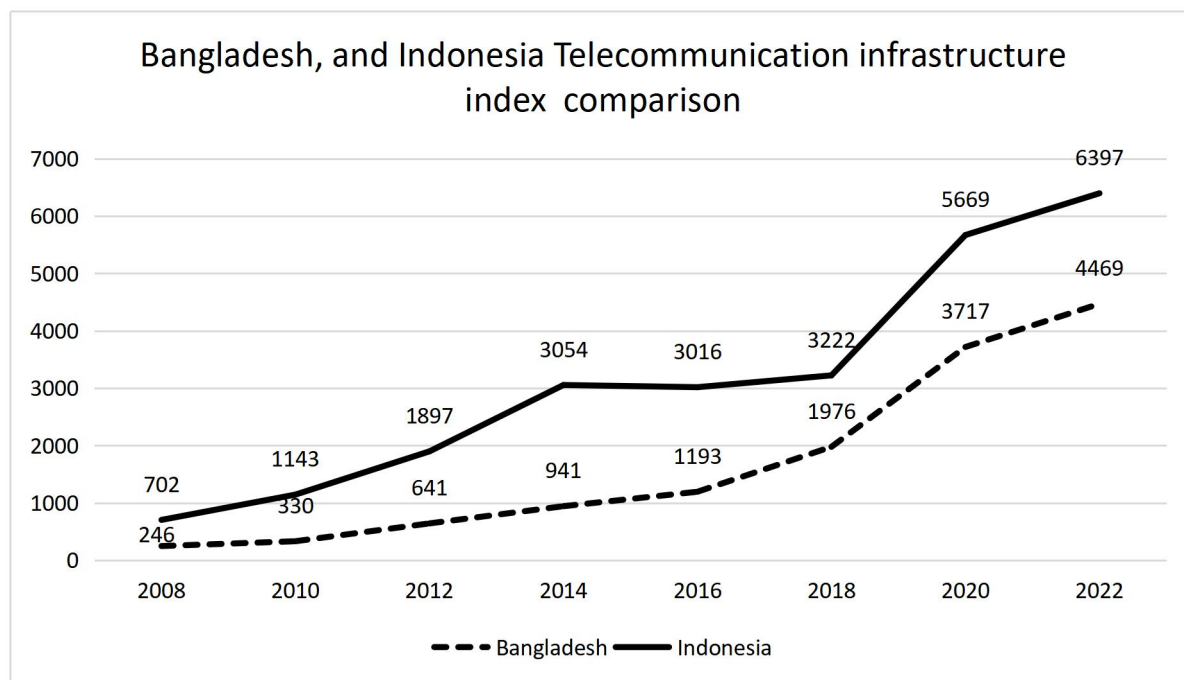
Source: United Nations database

4.2 Relevant discussion

In recent years, both Bangladesh and Indonesia have been actively working towards enhancing their e-governance systems. Nevertheless, there exist distinct disparities in their advancement and growth. Both nations have seen notable progress in e-governance in recent years, with advancements in infrastructure, administration, and citizen engagement. According to UN data, the e-governance of Indonesia and Bangladesh has shown improvement from 2008 to 2022 (Fig 1).

When comparing the E-government Development Index rating of Bangladesh and Indonesia, it is evident that Indonesia outperforms Bangladesh (Fig 1). According to the comparison of the components of the EGDI (Electronic Government Development Index) shown in Figure 3 and Figure 4, the main obstacles faced by e-Government in Indonesia are the limited access to information and communication technology (ICT) and the lack of human capital. The suboptimal performance of e-Government in Indonesia can be attributed to the government's insufficient focus on enhancing the quality of human resources and inadequate budget allocations for ICT infrastructure, which ultimately hinders the development of e-Government (Muzaqqi & Fitrianto, 2023; Thorpe et, al., 2024)**.**

Within the context of Bangladesh, the primary issues faced by the e-Government sector are online service provision and the development of telecommunications infrastructure, as depicted in Figure 2 and Figure 3. According to Thorpe et al. (2024), Bangladesh faces several obstacles including a shortage of skilled ICT personnel, a digital divide, limitations in infrastructure development due to financial restrictions, and inadequate legislative rules (Thorpe & Bikash Pokhrel, 2024). Khan & Zaber (2020) reported that the quality of online service at the local level in Bangladesh is really low (Khan & Zaber, 2020). In order to enhance the efficiency of the e-government system at the local level in Bangladesh, authorities need to devise more effective strategies.

Bangladesh has made considerable progress in HCI. E-governance is implementing innovative technology-based solutions in agriculture sector to increase food production and ensure food security in the 21st century, addressing the country's expanding (Sheikh & Berenyi, 2023). E-governance initiatives deliver e-agriculture services known as agronomy information management (AIM) (Kante, Oboko, & Chepken, 2016). With a trained workforce, training in digital literacy, and the successful application and efficacy of e-governance efforts in Bangladesh's agriculture sector, the government can guarantee the development of human capital (Sheikh & Berenyi, 2023).

5 Conclusion

In contemporary times, the implementation of e-government is imperative for all nations, regardless of their level of development. The advancement of e-Government in the digital era is rapidly progressing and evolving throughout all aspects of life. E-government involves meticulous strategic planning, which encompasses the provision of public services through the utilization of information and communication technology (ICT), digital infrastructure, and the transformation of government operations through ICT. This study compares the situation of Bangladesh and Indonesia and demonstrates that Indonesia has a higher EGDI rating than Bangladesh. However, the implementation of e-Gov in Indonesia falls short of expectations.

The comparative research indicates that Bangladesh and Indonesia should implement a more advanced e-government model in order to enhance their rankings in online services, promote progress in human development, and achieve sustainable development through effective governance. Both countries have recognized that investing in e-government infrastructure is crucial for promoting sustainable development and enhancing socio-economic indicators.

The United Nations provides essential guidelines for the implementation of E-Government, which encompass the establishment of technical infrastructure, the implementation of digital literacy initiatives, the provision of financial assistance, the formation of public-private partnerships, the enforcement of data security protocols, the demonstration of political dedication, the promotion of international cooperation, and the ongoing monitoring of progress. Conquering these challenges is essential for achieving the complete potential of digital government. The UN Policy Recommendations provide a strategic framework for the development of E-Government in Bangladesh and Indonesia. By applying these suggestions, both countries may overcome obstacles, enhance their government, and deliver better public services.

The report suggests that both countries should revise their national digital policies in response to the era of digitalization. In order to enhance e-governance, it is necessary to promote gradual change across all industries, leading to improved social and economic development. Enhanced e-governance systems have the potential to boost both domestic and foreign investment, as well as promote digital inclusion by narrowing the gap in digital access between rural and urban regions.

Now is the opportune moment to focus on e-governance and utilise stabilisation efforts to foster social and economic development within the country. To achieve effective e-governance, Bangladesh and Indonesia should study and draw lessons from countries like China, Singapore, and Korea that have successfully adopted such systems. By doing so, they may improve their outcomes and reach their goals more effectively.

Acknowledgments

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