Article

Bridging the digital divide through digital infrastructure

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Abstract: This paper aims to provide a comprehensive view of the E-Government Development Index analysis in Southeast Asia. Through a review of the results of an annual survey of 192 United Nations (UN) member states, the study identified 11 countries with the E-Government Development Index in Southeast Asia. The findings in this study revealed that the E-Government Development Index (EGDI) in Southeast Asian countries displays different levels of development. Singapore, Malaysia, and Brunei are the countries in the region with the highest EGDI scores. Singapore leads the area with a high EGDI score. These countries have effectively implemented advanced e-government services, such as online public services, digital infrastructure, and e-participation, which have greatly improved the quality of life of their citizens and the efficiency of their government function. On the other hand, countries such as Cambodia, Laos, and Myanmar lag in their e-government development as a result of factors such as limited Internet access, inadequate digital infrastructure, and low levels of digital literacy among the populations of these countries. In addition, some moderate progress has been made in the development of e-government in mid-level countries, such as Thailand, Indonesia, the Philippines, and Vietnam. These countries continue to improve their digital infrastructure and enhance their e-service offerings to close the digital divide. Overall, EGDI in Southeast Asia reflects different levels of digital transformation in the region, with each country facing its distinct set of difficulties and opportunities when it comes to leveraging technology for better governance and public service delivery.

Keywords: e-government development index; online service index; human capital index; telecommunication infrastructure index; Southeast Asia

1. Introduction

Over the past two decades, governments around the world have adopted information and communication technology (ICT) in their government administration (Andrew Whitmore, 2012; Kim and Kim, 2021; Verkijika and De Wet, 2016; Wagola et al., 2023). This is evident from all over the world adopting e-government in improving service transformation (Nkomo and Moyane, 2021), transparency (Akbar et al., 2022), administrative efficiency, interactivity, interconnectivity, organizational improvement, management systems, increasing citizen trust, uprooting corruption of government officials, and finally encouraging democratic governance (Torres-Porras and Duarte-Amaya, 2018). Thus, e-government competency development has become a significant aspect of most government strategies worldwide (Ahmed Al-Omari, 2006).

E-government is undoubtedly one of the most critical developments in government information over the past few decades (Whitmore, 2012). It is to promote democracy, reduce fraud, increase efficiency, and enhance citizen participation in government. Most countries in the world make compromises to improve e-government. For this reason, the UN conducted an e-government survey to determine each country's development level. The United Nations Public Administration Network (UNPAN) publishes an annual survey of 192 United Nations (UN) member states (Adjei-Bamfo et al., 2020; Abu-shanab, 2017; Baqir and Iyer, 2010; Peña-López, 2010; Stier, 2015; Torres-Porras and Duarte-Amaya, 2018; Zhao, 2011).

The survey results have spurred government officials and academics to compare or evaluate these programs to establish optimal criteria, acknowledge outstanding achievement, and encourage underperforming countries to invest in a crucial capability. Annually, the research team gathers data on the accessibility of online government services in every member nation, the telecommunications infrastructure in each nation, and many facets of what it refers to as a country's "human capital." The data is subsequently consolidated into a comprehensive index, which is then integrated into the primary E-Government Development Index, also known as e-government readiness.

The debate about the development of the E-Government Development Index has become a topic of discussion for some academics. Several empirical studies have shown various things about how the E-Government Development Index is measured. The development of e-government seems to be considered to be in absolute value and not relative to each country's economic and socio-cultural circumstances (Kabbar and Dell, 2012). Whitmore (2012) recommends that the addition of factor analysis and other statistical techniques be necessary to rank the E-Government Development Index. In Zambia, increasing interaction between the government and citizens is a challenge to the successful development of e-government (Chipeta, 2018). Cloud computing solutions and open (big) data can also influence the development of e-government (Máchová and Lněnička, 2015). Information technology, human development, and directed government policies are essential factors in the development of e-government (Doran et al., 2023; Ebrahim and Irani, 2005; Siau and Long, 2009; Tomaszewicz, 2015; Xiao, 2022).

Listing local measures and specific targets such as local authorities, intelligent cities, and SDGs can also be a factor in developing an E-Government Development Index (Meyerhoff Nielsen and Millard, 2020). According to Kumar et al. (2020), there is a correlation between the development of e-government and the five dimensions of culture defined by Hofstede (Kumar et al., 2020; Van et al., 2021). Still, only individualism, power distance, and long-term orientation are significantly correlated with the development of e-government.

The E-Government Development Index and the digital economy have a positive two-way relationship. Along with social, economic, political, technological, and demographic factors, specific national and cultural characteristics significantly influence the digital economy and the development of e-government (Ali et al., 2018). Income level, development status, and region are the three factors that distinguish the development of e-government in countries (Siau and Long, 2009).

Adding economic and corruption indicators is considered to provide more accurate results in measuring the development of the e-government. Deploying e-government solutions in the form of cloud computing enables the advantages of economies of scale (Andrew Whitmore, 2012). In addition, GDP per capita is also essential in developing the E-Government Development Index (Kumar et al., 2020).

In contrast to research conducted (Zhao et al., 2015), economic status is not a significant predictor of the digital divide or E-Government Development Index. Meanwhile, it is stated (Alisherovna Usmanova, 2021) that the GDP growth rate decreased along with the increase in the E-Government Development Index. For instance, the country's poor economic situation causes Yemen's low E-Government Development Index. Recession and crisis are obstacles to developing e-government in Europe (Kabbar, 2020; Lněnička, 2015; Machova and Lnenicka, 2016).

Some previous studies that have examined the E-Government Development Index include (Adjei-Bamfo et al., 2020; Etika and Upravljanja, 2022; Griffiths et al., 2021; Kabbar, 2020; Kalu, 2007; Machova and Lnenicka, 2016; Nurhidayat et al., 2024; Tintin et al., 2018; Torres-Porras and Duarte-Amaya, 2018; Verkijika and De Wet, 2016; Whitmore, 2012). For example, Whitmore (2012) evaluated current standards in e-government rankings, Abu-Shanab and Osmani (2019) examined from the side of e-government as a tool for entrepreneurship improvement, Machova and Lnenicka (2016) investigated and evaluated the specific challenges, trends, and progress of e-government between 2008 and 2014 in the MEMBER STATES of the European Union based on the global E-Government Development Index. While Zhao (2011) empirically tested whether national culture impacts the development of e-government in 84 countries around the world, Etika and Upravljanja (2022) verified whether and how the level of maturity of e-government affects the quality of government of a nation. From previous research mapping, studies on the E-Government Development Index have been widely studied in the European Union. However, research focusing on the E-Government Development Index in Southeast Asia has not been specifically studied. As such, the novelty of the research can complement previous research.

Therefore, the objective of this study is to analyze the E-Government Development Index in Southeast Asia. This was performed by conducting a confirmatory factor analysis on the raw data reported in the "Data table" section of the "Statistical Annex" in the United Nations 2016–2022 E-Government Survey. The article consists of six sections focusing on the initial aspect of development, specifically online services. The second dimension refers to the establishment of a reliable telecommunications infrastructure that can support online services. The fourth component involves educating citizens so that they can effectively utilize information and communication technology (ICT). The dimension is represented by the three sub-indices of EGDI, namely the Online Service Index (OSI), Human Capital Index (HCI), and Telecommunication Infrastructure Index (TII). The purpose of this EGDI sub-index is to provide a comparative analysis between Southeast Asia and nations that have achieved favorable outcomes in each sub-index.

This research has both theoretical and practical ramifications. This work has significant theoretical significance as it not only offers empirical support and validates the conclusions of prior investigations but also broadens the scope and

updates the results of comparable studies. Furthermore, it provides unbiased and accurate information as well as authoritative evaluations that analyze the e-government situation in a country. This research presents the E-Government Development Index (EGDI) for Southeast Asia, which serves as a metric for assessing and displaying the progress of countries in establishing their e-government systems. The practical consequences of this study's findings, along with the techniques provided in this article, can assist government officials and decision-makers in designing and implementing policies and procedures to enhance e-government services and development. This research draws inspiration from the work of Torres-Porras and Duarte-Amaya (2018), which analyses the E-Government Development Index in the South American region and Renata Machova and Lnenicka (2016), inspecting an analysis of the progression of e-government development throughout time. These three publications utilized cluster analysis as a method to investigate the E-Government Development Index in Southeast Asia.

2. Materials and methods

2.1. Data considerations

Prior to introducing the Southeast Asia E-Government Index and its analysis, it is necessary to address two factors to prevent any potential misinterpretation regarding the information being presented. These considerations are as follows: 1) Countries included in Southeast Asia are the focus of study and analysis. These countries are Indonesia (IN), Malaysia (ML), Singapore (SG), Brunei Darussalam (BD), Philippines (FP), Thailand (TL), Cambodia (KB), Laos (LS), Vietnam (VN), and Myanmar. This sub-index is based on the consideration that the e-government should include different dimensions to ensure that people benefit from online services and information. The study relied on data from the United Nations E-Government Development Index (EGDI). The index score provides an independent and credible source in terms of e-government development. A brief description of each statistically analyzed variable for the study is presented below.

EGDI: (0.34 × Online Service Index) + (0.33 × Telecommunication Index) + (0.33 × Human Capital Index)

Within the range of EGDI values 0 to 1, the countries were then grouped into four levels that are mathematically defined as follows: very high EGDI values range from 0.75 to 1.00 inclusive, high EGDI group values are in the range of 0.50 to 0.7499 inclusive, intermediate EGDI values are in the range of 0.25 to 0.4999 inclusive, and low EGDI values range from 0.0 to 0.2499 inclusive (Knowledgebase, 2023). In all references to this range in text and graphic elements, each value was rounded for clarity and expressed as follows: 0.75 to 1.00, 0.50 to 0.75, 0.25 to 0.50, and 0.00 to 0.25. To better understand the situation of country subgroups with similar performance levels within each EGDI group, each EGDI group was further divided into four intervals or equally defined quartiles 1.

2.2. Theory/calculation

2.2.1. The United Nations E-Government Development Index (EGDI)

EGDI is a composite of capability levels and national online service states. The index is based mainly on a UN survey of the online presence of 192 UN Member States conducted in 2009. The index assesses the performance of national governments relative to each other. It is a weighted average of three normalized scores on the three most important dimensions of e-government: (1) online service coverage and quality, (2) telecommunications infrastructure, and (3) human capacity. The maximum possible value is one, while the minimum is zero. Mathematically, the above three dimensions of e-government and the three normalized scores of the weighted average are called EGDI (Ahmadi et al., 2022).

$$EGDI= 1/3[\text{OSI Normalized} + \text{HCI Normalized} + \text{TII Normalized}]$$

To ensure that the EGDI is equally decided between the three components, the standard z-score procedure was implemented. EGDI is used as a benchmark to show the plans and strategies for the e-government development of UN Member States.

$$EGDI: (0.34 \times \text{Online Service Index}) + (0.33 \times \text{Telecommunication Index}) + (0.33 \times \text{Human Capital Index})$$

2.2.2. Scope and quality of online services

The online services index evaluates the degree of accessibility of web information in each country, including national websites, related portals, and websites linked with ministries, such as education, labor, social services, health, finance, and the environment. The index adheres to the Web Content Accessibility Guidelines set by the World Wide Web Consortium (Elbahnasawy, 2014). The index is constructed using a four-stage model that measures the level of maturity of online services. The first stage involves the establishment of an essential online presence through a simple website. The second stage consists of the improvement of information services by providing multimedia content and enabling two-way interaction. The third stage involves the online provision of transactional services. The fourth and final stage comprises the implementation of connected services, where government websites communicate with citizens using interactive equipment.

2.2.3. Telecommunication Infrastructure Index

The telecommunications infrastructure index is determined by five key indicators: the number of personal computers, the number of Internet users, the number of telephone lines, the volume of mobile subscriptions, and the level of improved broadband subscriber subscriptions and fixed broadband facilities.

2.2.4. Human Capital Index

The Human Capital Index comprises the adult literacy rates and gross enrollment ratios for primary, secondary, and tertiary education (Elbahnasawy, 2014).

3. Results and discussion

The study consists of five parts: Part I focuses on the E-Government Development Index (EGDI), Part II examines the E-Government Ranking, Part III analyses the Online Service Index (OSI), Part IV explores the Human Capital Index (HCI), and Part V investigates the Telecommunication Infrastructure Index (TII). The data for these five parts are presented in brackets for the past five years.

3.1. E-Government Development Index (EGDI)

The E-Government Development Index (EGDI) ranks scores in descending order from highest to lowest. Scores ranging from 0.75 to 1.00 are classified as very high, scores spanning from 0.50 to 0.75 are categorized as high, scores from 0.25 to 0.50 are grouped as medium, and scores below 0.25 are classed as low (Torres-Porras and Duarte-Amaya, 2018). **Table 1** is structured as follows: Southeast Asian countries are represented in the first column. Country EGDI score data from year to year is displayed in another column.

Table 1. Southeast Asia countries' EGDI score from 2016–2022.

Country name/year	E-Government Development Index			
	2022	**2020**	**2018**	**2016**
Singapore	0.91	0.92	0.88	0.88
Malaysia	0.77	0.79	0.72	0.62
Thailand	0.77	0.76	0.65	0.55
Brunei Darussalam	0.73	0.74	0.69	0.53
Philippines	0.65	0.69	0.65	0.58
Vietnam	0.68	0.67	0.59	0.51
Indonesia	0.72	0.66	0.53	0.45
Cambodia	0.51	0.51	0.38	0.26
Timor-Leste	0.44	0.46	0.38	0.26
Myanmar	0.5	0.43	0.33	0.24
Laos People's Democratic Republic	0.38	0.33	0.31	0.31

Table 1 presents the E-Government Development Index in Southeast Asia with a very high score index in the 2016–2020 time bracket. Singapore's E-Government Development Index is in the high category of 0.91–0.88. Singapura is cataloged with a high score and has changed over the last five years. At the same time, countries with a high average E-Government Development Index category are Malaysia, Thailand, Brunei Darussalam, the Philippines, and Vietnam, with scores above 0.50–7.50. However, Malaysia and Thailand experienced significant changes in EGDI scores in the 2020–2022 time bracket and were included in the high score category. Furthermore, countries with an EGDI index score in the medium category are Indonesia, Cambodia, Timor-Leste, Myanmar, and Laos People's Democratic Republic, with an IGDI score above 0.25. However, in Myanmar in 2016, the index EGDI was included in the low score category with a score below 0.25.

3.2. E-Government ranking

The E-Government ranking categorizes nations according to their scores in EDGI-specific data, specifically focusing on Southeast Asia nations. The order of these scores determines the evaluation of e-government rankings. The results improve as the position decreases—the ranking's probability values vary from 1 to 11, corresponding to the number of nations analyzed. The ranking serves as a convenient tool for promptly determining the position of e-government development

and the degree of a country (Torres-Porras and Duarte-Amaya, 2018). The structure of **Table 2** is as follows: The first column contains the representation of Southeast Asian countries. The data for the country's EGDI Ranking is presented in a separate column for each year.

Table 2. Southeast Asia countries' E-Government ranking from 2016–2022.

Country name/year	E-government ranking			
	2022	**2020**	**2018**	**2016**
Singapore	12	11	7	4
Malaysia	53	47	48	60
Thailand	55	57	73	77
Brunei Darussalam	68	60	59	83
Philippines	89	77	75	71
Vietnam	86	86	88	89
Indonesia	77	88	107	116
Cambodia	127	124	145	158
Timor-Leste	147	134	142	160
Myanmar	134	146	157	169
Laos People's Democratic Republic	159	167	162	148

Table 2 displays the E-Government Ranking of the 11 countries studied. The order in the table above indicates the E-Government ranking. The first position, namely Singapore, has been ranked first for the last five years, although it is understood that Singapore's E-Government rating in the previous five years brackets has also decreased. The second position is Malaysia, with the e-government experiencing an average change in ranking. This E-Government ranking is quite good. The third rank is Thailand, with a yearly e-government ranking that has decreased. Although its e-government has not yet entered the top 10 categories of e-government, it changes significantly every year. Then, several countries have good E-Government rankings every year; for example, Indonesia, which was ranked 116th, could rise to 77th place, and Vietnam, which is a country with an E-Government ranking, has recorded good achievements from year to year. Myanmar, for instance, has ranked well this year and in the last five years. Meanwhile, other countries with fluctuating classes are the Lao People's Democratic Republic, Timor-Leste, and Cambodia.

3.3. Online Service Index (OSI)

The index is derived from a four-stage model of online service maturity: an initial online presence with an essential website; improved information services through the distribution of multimedia content and two-way interaction; online delivery of transactional services; and interconnected services where government websites engage with citizens using interactive equipment. Four levels are inspected annually. The structure of **Table 3** is as follows: The first column contains the representation of Southeast Asian countries, whereas the second column displays the OSI scores of countries over time.

Table 3. Southeast Asia countries' OSI score from 2016–2022.

Country name/year	Online Service Index (OSI)			
	2022	2020	2018	2016
Singapore	0.96	0.96	0.99	0.97
Malaysia	0.76	0.85	0.89	0.72
Thailand	0.78	0.79	0.64	0.55
Brunei Darussalam	0.59	0.64	0.72	0.51
Philippines	0.63	0.73	0.88	0.67
Vietnam	0.65	0.65	0.74	0.57
Indonesia	0.76	0.68	0.57	0.36
Cambodia	0.42	0.45	0.25	0.05
Timor-Leste	0.39	0.44	0.31	0.22
Myanmar	0.31	0.26	0.23	0.16
Laos People's Democratic Republic	0.30	0.19	0.17	0.28

Based on the table above, the order of OSI in each country with the highest score and included in the excellent category can be seen. The OSI data for Singapore in **Table 3** reveals the best index in Southeast Asia, with an average OSI of 0.96 over the 5-year bracket. Furthermore, Malaysia, with an OSI average of 0.72–0.89, and Thailand, with an OSI average of 0.55–0.79, indicates that the OSI owned by them is good. Indonesia's OSI value in the 5-year time bracket has also improved. Meanwhile, in several other countries, the OSI value experiences positive changes and vice versa every year.

3.4. Human Capital Index (HCI)

Table 4. Southeast Asia countries' HCI score from 2016–2022.

Country name/year	Human Capital Index (HCI)			
	2022	2020	2018	2016
Singapore	0.90	0.89	0.86	0.84
Malaysia	0.76	0.75	0.70	0.70
Thailand	0.79	0.78	0.79	0.69
Brunei Darussalam	0.76	0.76	0.75	0.73
Philippines	0.76	0.75	0.72	0.68
Vietnam	0.69	0.68	0.65	0.6
Indonesia	0.74	0.73	0.69	0.68
Cambodia	0.54	0.53	0.56	0.48
Timor-Leste	0.55	0.56	0.54	0.48
Myanmar	0.58	0.51	0.51	0.48
Laos People's Democratic Republic	0.55	0.55	0.53	0.49

The Human Capital Index quantifies the capacity of individuals to engage with digital services provided by their governments. The index comprises four components: the Human Capital Index includes adult literacy rates and gross

enrollment ratios for primary, secondary, and higher education. **Table 4** displays the Human Capital Index (HCI). The data for the country's HCI score is shown in a separate column for each year.

HCI data is exhibited in **Table 4**. The country averages from 2016 to 2022 in this index are the best of the three EGDI sub-indices, with values of 0.84–0.90 over the last five years of making improvements. Furthermore, Malaysia, Thailand, Brunei, Darussalam, Philippines, and Indonesia have an average HCI value of 0.68–0.79. The five countries showed that over the last five years, they improved. Also, Cambodia, Timor-Leste, Myanmar, and Laos People's Democratic Republic have an average HCI of 0.48–56.

3.5. Telecommunication Infrastructure Index (TII)

The telecommunications infrastructure index measures the level of development of the infrastructure that will support e-government. The telecommunications infrastructure index is calculated using five indicators: the number of personal computers, the number of Internet users, the number of telephone lines, the count of mobile subscriptions, and the number of upgraded broadband subscriber subscriptions and fixed broadband facilities. Each year, the five indicators are examined. **Table 5** is organized in the following manner: The first column represents the countries of Southeast Asia. The data for the country TII Score is displayed in the other columns, showing the changes from year to year.

Table 5. Southeast Asia countries' TII score from 2016–2022.

Country name/year	Telecommunication Infrastructure Index (TII)			
	2022	**2020**	**2018**	**2016**
Singapore	0.88	0.89	0.8	0.8
Malaysia	0.76	0.76	0.56	0.44
Thailand	0.79	0.70	0.53	0.41
Brunei Darussalam	0.84	0.82	0.61	0.35
Philippines	0.56	0.58	0.35	0.38
Vietnam	0.70	0.67	0.39	0.37
Indonesia	0.64	0.57	0.32	0.30
Cambodia	0.56	0.55	0.31	0.25
Timor-Leste	0.36	0.39	0.29	0.07
Myanmar	0.61	0.52	0.26	0.07
Laos People's Democratic Republic	0.28	0.24	0.22	0.15

The data above demonstrates data about the Telecommunication Infrastructure Index (TII). The country with the highest TII value is Singapore, which had a TII value of 0.88 in 2022. Then, Malaysia had an average TII value of 0.76. Furthermore, Thailand significantly improved its TII value every year. Some other countries can see the TII value in the table.

4. Discussion

4.1. The E-Government Development Index analysis in Southeast Asia

Based on the results visualized above, it can be seen that e-government has become an essential direction for government development. Measuring e-government development indicators can help government agencies better understand the actual situation of e-government (Xiao, 2023). The E-government Development Index proves the state of e-government for the development of United Nations Member States. According to the rankings provided by EGDI, the most significant overall progress is evidenced by specific countries by region due to the development of different actions and strategies by each sub-index.

First, Singapore has the highest E-Government Development Index in Southeast Asia based on E-Government rankings calculated in brackets for the last five years. This is inseparable from the influence of the quality level of online service, human capital, and telecommunication infrastructure indexes. Singapore's Online Service Index starts from the institution with authority related to e-government in Singapore, the Infocomm Development Authority (IDA). In contrast, the leading portal for e-government in Singapore is the E-Citizen (Scott Baum, 2014). E-Citizen provides approximately 1600 online public services. It was first launched in 1999 and has continued now. The vision of the e-Citizen Portal includes reinventing government, providing integrated electronic services, being proactive and responsive, using ICT to build capability and capacity and innovating with ICT.

4.2. Evaluating the E-Government Development Index against each Southeast Asian country

The focus of this analysis is on how each Southeast Asian Country fares in terms of its performance in the index's three primary components: the Online Service Index (OSI), the Telecommunication Infrastructure Index (TII), and the Human Capital Index (HCI).

1) Singapore

OSI: Singapore maintains excellent rankings year after year, which indicates a solid commitment to offering online services that are both efficient and user-friendly.

TII: Singapore has a highly developed telecommunication infrastructure, offering citizens easy access to high-speed Internet and mobile broadband services nationwide.

HCI: Singapore's high Human Capital Index score can be attributed, in part, to the country's highly educated and technologically savvy populace.

2) Malaysia

OSI: Malaysia has made tremendous progress in developing its online services and now provides its citizens with various e-government services. Malaysia is a member of the Open Society Institute.

TII: Malaysia's telecommunications infrastructure is quite well developed, and the country's population is rapidly gaining access to broadband services.

HCI: The country of Malaysia has a reasonably high HCI score, which indicates that the populace has a high level of education and is proficient in ICT.

3) Thailand

OSI: Thailand has achieved significant progress in enhancing its online services, with continued attempts to digitize government services. Thailand is a member of the Open Society Institute.

TII: The infrastructure of Thailand's telecommunications companies is being upgraded, and broadband services are growing, particularly in urban areas.

HCI: Thailand has a reasonably high HCI score, which reflects the country's educated population and developing proficiency in ICT.

4) Philippines

OSI: The Philippines has made significant strides toward enhancing the quality of its online services, owing to the implementation of several different e-government programs.

TII: The Philippine information and communications technology infrastructure is undergoing development, and there are continuing initiatives to improve Internet access and connectivity.

HCI: The Philippines has a score that is considered to be of a moderate HCI level; nonetheless, there is space for improvement in the areas of education and ICT skills.

5) Indonesia

OSI: Indonesia has made significant progress in improving the quality of its online services thanks to several e-government initiatives in recent years.

TII: The infrastructure of Indonesia's communications companies is expanding, and more people, especially in metropolitan areas, now have access to broadband Internet services.

HCI: Indonesia's Human Capital Index (HCI) is considered moderate, and the country is continually increasing its education and ICT skills.

6) Vietnam

OSI: Vietnam has progressed in upgrading its online services, focusing on digitizing government services. OSI has recognized Vietnam for this achievement.

TII: The infrastructure of Vietnam's telecommunications companies is improving, and more people are gaining access to broadband services.

HCI: Vietnam has a score in the middle of the pack for HCI, and there is an opportunity for growth in terms of education and ICT abilities.

7) Myanmar

OSI: Myanmar has made some progress in enhancing its Internet services, but there is still potential for development. Myanmar is a member of the OSI.

TII: The infrastructure of Myanmar's telecommunications industry is plagued with problems, including restricted access to high-quality telecommunication services.

HCI: Myanmar has a poor HCI score, which indicates that the country's education system and ICT skills need to be improved.

8) Laos

OSI: Laos has made some steps toward improving the quality of its online services, but there is still room for expansion in this area.

TII: The provision of universal access to telecommunication services of sufficient quality is challenging to achieve in Laos.

HCI: Laos has a low Human Capital Index score, which indicates that the country's education system and its proficiency in ICT both need to be improved.

9) Cambodia

OSI: Cambodia has achieved modest progress in enhancing its online services, and there is a need for additional development.

TII: The provision of universal access to telecommunication services of sufficient quality presents several difficulties for Cambodia.

HCI: Cambodia has a low Human Capital Index score, which indicates a need for improvement in the country's education and ICT skills.

10) Brunei

OSI: Brunei has progressed in upgrading its online services with ongoing initiatives to digitize government services. The Open Society Institute of Brunei provided this information.

TII: The infrastructure of Brunei's telecommunications industry is pretty established, and the country's population is gradually gaining access to broadband Internet services.

HCI: Brunei has a reasonably high HCI score, which indicates that the populace has a high level of education and is proficient in ICT.

4.3. Overall summary of E-Government Development Index analysis in Southeast Asian countries

The E-Government Development Index (EGDI) in Southeast Asian countries displays various development levels. Singapore, Malaysia, and Brunei are the countries in the region with the highest EGDI scores. Singapore leads the area with a high EGDI score. These nations have effectively implemented advanced e-government services, such as online public services, digital infrastructure, and e-participation, which have considerably enhanced the quality of life of their residents and the efficiency with which their governments function. On the other side, nations such as Cambodia, Laos, and Myanmar are falling behind in developing their e-governments due to limited access to the Internet, inadequate digital infrastructure, and low levels of digital literacy among these nations. Some moderate progress has been made in developing e-government in middle-tier nations, such as Thailand, Indonesia, the Philippines, and Vietnam. These countries are continuing to improve their digital infrastructure and increase their e-service offerings to close the digital divide. Overall, the EGDI in Southeast Asia reflects the region's various levels of digital transformation, with each country confronting its distinct set of difficulties and opportunities in harnessing technology to better governance and deliver public services.

5. Conclusion

In this study, it can be concluded that the E-Government Development Index (EGDI) in Southeast Asian countries exhibits various levels of development. Singapore, Malaysia, and Brunei are the countries in the region with the highest EGDI scores. Singapore takes the lead in the area with a high EGDI score. These countries have effectively implemented advanced e-government services, such as

online public services, digital infrastructure, and e-participation, which have greatly improved the quality of life of their citizens and the efficiency of their government functions. On the other hand, countries such as Cambodia, Laos, and Myanmar lag in their e-government development as a result of factors such as limited Internet access, inadequate digital infrastructure, and low levels of digital literacy among the populations of these countries. Besides, some moderate progress has been made in the development of e-government in mid-level countries, such as Thailand, Indonesia, the Philippines, and Vietnam. These countries continue to improve their digital infrastructure and enhance their e-service offerings to close the digital divide. Overall, EGDI in Southeast Asia reflects different levels of digital transformation in the region, with each country facing its distinct set of difficulties and opportunities when it comes to leveraging technology for better governance and public service delivery.

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