



Facultad de Ciencias Humanas y Sociales  
Bachelor's in Global Communication

## Final Thesis

The effects of the Digital Divide  
A case study of Indonesia

Student: Clara Villate Curiel

Professor: Melanie Gut

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## **LIST OF ABBREVIATIONS**

Asian Development Bank (ADB)

Attention Deficit Hyperactivity Disorder (ADHD)

Electronic System Operators (ESO)

Electronic-based Governing System (SPBE)

Foreign Direct investment (FDI)

Indonesia's Development Index (IDI)

Indonesian Internet Service Providers Association (APJII)

Information and Technologies (ICTs)

International Labour Organization (ILO)

Ministry of Communication and Information (MCI)

Small and medium enterprises (SMEs)

Telecom regulatory Authority of India (TRAI)

United Nations Development Program (UNDP)

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## **1. ABSTRACT**

This thesis examines the digital divide in Indonesia, exploring its dimensions, drivers, and socio-economic consequences, particularly focusing on education and income inequality. Despite significant advancements in digital infrastructure, Indonesia suffers from stark disparities in digital access across its different islands, exacerbating socio-economic inequalities. Using the Knowledge Gap Hypothesis as a theoretical framework, this study investigates how these disparities impact educational outcomes and employment opportunities. It highlights the role of government interventions and policies aimed at bridging the digital divide, assessing their effectiveness in fostering digital inclusion. Through an in-depth analysis of digital infrastructure distribution and the effects of the digital divide on various socio-economic sectors, this research underscores the critical need for comprehensive and equitable digital policies to ensure inclusive growth and development in Indonesia.

Key words: digital divide, inequality, access, Indonesia, education, digitalization

## **2. RESUMEN**

Esta Trabajo de Fin de Grado examina la brecha digital en Indonesia, explorando sus dimensiones, causas y consecuencias socioeconómicas, con un enfoque particular en la educación y la desigualdad de ingresos. A pesar de los avances significativos en la infraestructura digital, Indonesia sufre marcadas desigualdades en el acceso digital en sus diferentes, exacerbando las desigualdades socioeconómicas. Utilizando la Hipótesis de la Brecha del Conocimiento como marco teórico, este estudio investiga cómo estas disparidades impactan en la educación y las oportunidades de empleo. Se destaca el papel de las intervenciones y políticas gubernamentales destinadas a cerrar la brecha digital, evaluando su efectividad en fomentar dicha inclusión digital. A través de un análisis en profundidad de la distribución de la infraestructura digital y los efectos de la brecha digital en varios sectores socioeconómicos, esta investigación subraya la necesidad crítica de políticas digitales integrales y equitativas para asegurar un crecimiento y desarrollo inclusivo en Indonesia.

Palabras Clave: brecha digital, desigualdad, acceso, Indonesia, educación, digitalización.

### 3. INTRODUCTION

We are living in a rapidly evolving era of constant change, where digital technology has become a force shaping economies, societies, and even individual lives. Thus, access to digital media has become a key component of social and economic inclusion. However, significant disparities in digital access and literacy—commonly referred to as the digital divide—persist across the globe. This divide manifests in varying degrees of access to information and communication technologies (ICTs), creating a chasm between those who can fully participate in the digital age and those who are left behind. This work aims to **identify the dimensions of the digital divide** in Indonesia, including the access to technology and the digital literacy, as well as **analyse its socio-economic consequences** on the country. For these purposes, this thesis will delve deeper on the different drivers of this gap in Indonesia and the bridging role of the government.

Indonesia is an emerging power in Southeast Asia, with a vast amount of natural resources and a strategic geographic location, the country plays a pivotal role between rising China's Belt and Road Initiative and Australia's concern as the representative of the west in the region (Lim et al., 2020). However, despite its position and its significant advancements in various sectors - including manufacturing, services, and digital technology - contributing to its rising GDP, Indonesia is a complex country, with over 17,000 islands characterized by a stark contrast between urban and rural areas, both in terms of economic development and access to digital infrastructure (Negara and Wihardja, 2024). These contrasts conform Indonesia an ideal case study for examining the digital divide.

As for the personal motivations that drive this work, they lay on my experience living in Indonesia. During my stay I was stunned by the differences between the digital engagement of Surabaya and the lack of internet connection of some parts of Sumatra or Papua. The differences between the infrastructure of Jakarta and the circular economy of Jogjakarta composed of simple *warungs* (small and humble family-owned retails or eateries).

These striking differences left me wondering about their consequences on the country's development and life quality in terms of education and income. And, while witnessing

these striking disparities in my daily life, I studied the digital divide in my Digital Governance class in university. Never had I heard of that concept and nor had my Indonesian classmates, which surprised me even more and made me question how can a problem that people do not know about be solved. Furthermore, my experience living with a *mentawaiian* family in the depths of the jungle in Sumatra, without access to electricity or any kind of technology, deepened my awareness of the existing digital divide. I wondered the extent of the implications of the lack of political and economic participation of indigenous communities like that one, and others in Sulawesi and Papua, and motivated me to choose this topic in search for answers.



*Figure 1 Teteu and Clara*

*Muntei, Mentawai, Sumatra, Indonesia*

*Source: Author's own*

#### **4. METHODOLOGY**

This study employs a qualitative research approach to explore the digital divide in

Indonesia and its impact on education and income inequality. The methodology consists of two main components: a literature review and an case study analysis.

First, the literature review serves as the foundation for this research, providing a comprehensive theoretical framework and understanding of the existing knowledge on the digital divide. The review involved sourcing information from academic journals, government reports, and publications from international organizations such as the World Bank, UNESCO, and the International Labour Organization. The primary aim of the literature review was to identify the dimensions of the digital divide, its drivers, and its socio-economic impacts, with a particular focus on developing countries.

Second, the case study analysis focuses on Indonesia, chosen for its diverse geographical and socio-economic landscape - as well as for personal interest - which provides a rich context for examining the digital divide. The study analyses existing data on digital infrastructure, internet penetration rates, and the disparities between different regions and islands within Indonesia. Particular emphasis was placed on the differences between urban centres like Java and rural areas such as Papua and Kalimantan. Secondary data from government reports, such as those from the Ministry of Communication and Informatics, and academic studies were used to illustrate the current state of digital access and its implications. Furthermore, as for the analysis, this study also relies on the author's gatherings during her time living in the country and the information she collected travelling to rural areas and spending time with locals from who she learnt invaluable insights.

However, this study acknowledges certain limitations in its methodology. The reliance on secondary data may not capture the most recent developments, and the case study approach, while providing in-depth insights, may not be generalizable to all regions within Indonesia or other developing countries. These limitations highlight the need for future research to employ larger and more diverse samples and explore the qualitative aspects of digital literacy and its socio-economic impacts more deeply.



## 5. STATE OF THE ART

### 5.1. Digital divide as a concept

The term "digital divide" was first used in the late 20th century, initially describing the gap between individuals with access to digital technologies, such as cellphones and the internet, and those without (Hargiatti, 2003, p.4). "*The digital divide refers to the gap perceived between the people who have access to the latest information technologies and those who do not*" (Compline, 2001, n.p, preface). The constant evolution and change of the information age, makes the digital divide a difficult concept to grasp. This paper takes Compaine's definition because it is one that does not need to be modified or changed with time as it refers to the **latest** information technologies. In addition, the concept of the digital divide extends beyond just the physical access to computers and the internet. It is crucial to also consider factors such as content accessibility, language barriers, educational opportunities, literacy levels, and the availability of community and social resources (Warschauer, 2002; Hargittai, 2003).

Early discussions on the digital divide varied significantly in perspective. Some experts believed that the proliferation of technology would naturally bridge this gap over time (Compaine, 2001), diminishing the need for policy interventions; while others warned that without deliberate policy interventions, the divide would continue to widen, exacerbating existing inequalities (Dickard, 2002). Research supports the latter view, showing that mass media and information technologies often amplify existing knowledge gaps. For instance, studies on media consumption patterns have consistently shown that those with higher socio-economic status and greater exposure to media tend to acquire information more effectively, a phenomenon known as the Matthew effect. This suggests that the digital divide may actually lead to increased information gaps, reinforcing socio-economic disparities rather than alleviating them (Gaziano, 1983; Eveland and Scheufele, 2000). Today this debate is yet to be settled as despite the digital era we live in, the digital divide and its dimensions are not widely researched and information is rather limited.

Regarding the geographic presence of the digital divide, since it is a global phenomenon that manifests differently across various regions, not only reflecting the disparities in access to digital technology and the internet within countries, but also those existing among one nation's population. In developed countries, high levels of internet penetration and widespread access to advanced digital infrastructure characterize the landscape, with

most of the population enjoying seamless connectivity and technological integration into daily life. In stark contrast, developing countries, particularly in regions such as Sub-Saharan Africa, Southeast Asia, and parts of Latin America, face significant challenges in bridging the digital divide. In these areas, limited access to affordable internet, inadequate digital infrastructure, and socio-economic barriers significantly hinder digital inclusion. For instance, rural and remote regions often lag far behind urban centres in terms of internet connectivity and digital literacy. This disparity not only exacerbates existing socio-economic inequalities but also impedes sustainable development and economic growth (Hilbert, 2011). In countries like Indonesia, the digital divide is pronounced, with urban-rural divides, income inequality, and educational disparities playing crucial roles. Efforts to address these challenges are ongoing, but the need for comprehensive strategies that encompass infrastructure development, affordability, and digital literacy initiatives remains critical for narrowing the gap and ensuring equitable digital access for all (Hargittai, 2002).

## 5.2 Drivers

The digital divide is driven by a complex interplay of various factors that create and perpetuate disparities in access to digital technologies and the internet. Due to space limitations, this paper will broadly categorize these factors into economic, social, infrastructural, educational, and policy-related. Understanding these drivers is crucial for developing effective strategies to bridge the gap and promote digital inclusion.

First, **economic inequality** is one of the most significant drivers of the digital divide. As Guillén and Suárez (2005) discuss, national income levels heavily influence internet use, with wealthier nations typically having higher levels of digital access compared to poorer countries. Additionally, within countries, individuals with higher incomes are more likely to afford digital devices, internet services, and the associated costs of maintaining and upgrading these technologies. In contrast, low-income families often struggle to prioritize spending on digital tools over other necessities, resulting in limited access to digital resources (Cruz-Jesus et al., 2018). This economic barrier is particularly stark in developing countries, where a significant portion of the population lives below the poverty line, further sharpening the divide.

Economic factors also affect the availability of digital infrastructure and services. In regions with limited economic resources, investments in broadband infrastructure and high-speed internet are often insufficient. This lack of investment leads to slower internet speeds, higher costs for

services, and fewer options for consumers. The economic divide thus creates a vicious cycle where those with fewer resources have less access to the digital economy, technology, thus limiting their opportunities for economic development (Kraemer et al., 2009).

Second, **social determinants**, such as age, gender, and ethnicity, significantly influence access to digital technologies. Warschauer (2003) highlights that older adults may find it challenging to adapt to rapidly changing technologies, leading to a generational gap in digital literacy. Younger generations, growing up with digital devices, are typically more adept at using these technologies, but the generational gap can leave older individuals isolated from the digital world, affecting their ability to access information and services. Moreover, gender disparities are also prevalent, particularly in patriarchal societies where women may have less access to education and employment opportunities. These societal norms can limit women's access to digital technologies, further widening the digital divide. (van Dijk, 2005). In addition, ethnic minorities and marginalized groups such as indigenous communities often face systemic barriers, including language differences, lower levels of digital literacy, and discrimination. These barriers can prevent these groups from fully engaging with digital technologies and benefiting from their potential (Warschauer, 2003).

Third, as briefly mentioned above, the quality and availability of **digital infrastructure** are critical drivers of the digital divide. Urban areas tend to have better infrastructure, including high-speed broadband networks, fiber-optic connections, and extensive mobile coverage. In contrast, rural and remote areas often lack these amenities, leading to significant disparities in internet access and speed (Cruz-Jesus et al., 2018). This urban-rural divide means that people living in remote areas have limited access to digital technologies, affecting their ability to participate in the digital economy.

Furthermore, **education** plays a crucial role in shaping digital literacy and skills. Access to quality education and training programs is essential for individuals to effectively use digital technologies. However, educational inequalities, such as disparities in school funding, teacher quality, and availability of digital learning resources, contribute to the digital divide. Schools in affluent areas are more likely to have the resources to provide students with access to digital devices and high-speed internet, as well as trained teachers who can integrate digital literacy into the curriculum (Warschauer, 2003). Conversely, schools in under-resourced areas often lack basic digital infrastructure and educational materials. Students in these environments have fewer opportunities to develop digital skills, which affects their ability to compete in an increasingly digital job market. This educational gap perpetuates the cycle of digital exclusion, limiting economic and social opportunities for disadvantaged groups (van Dijk, 2005).

Lastly, **government policies and regulatory frameworks** significantly impact the digital divide. Effective policies can promote digital inclusion through initiatives such as subsidies for internet access, investment in digital infrastructure, and support for digital literacy programs. However, in many regions, policies may be insufficient, poorly implemented, or lack coordination among various stakeholders. In some cases, political instability and corruption hinder the development and implementation of policies aimed at bridging the digital divide (Guillén & Suárez, 2005; van Dijk, 2005). For example, Estonia's "e-Estonia" initiative is a successful case study where policy interventions have significantly improved digital access. The Estonian government implemented comprehensive digital policies, including nationwide internet access, e-residency, and digital literacy programs. These policies transformed Estonia into one of the most digitally advanced countries, providing a model for other regions to follow. The government's focus on digital infrastructure, inclusive policies, and continuous innovation has enabled widespread digital inclusion, making Estonia a leading example of effective digital divide reduction (Cruz-Jesus et al., 2018).

### 5.3 Types

The digital divide can be understood in terms of various dimensions, each highlighting different aspects of inequality in access to and use of digital technologies. Authors like Taylor (2024) emphasize three primary types: the access divide, the use divide, and the quality-of-use gap. Each of these types reveals distinct challenges that need to be addressed to achieve digital inclusion. Other scholars have identified further nuances within these divides.

The **access divide** is the most visible and widely recognized form of the digital divide. It refers to the socioeconomic differences that affect people's ability to afford and access digital devices and internet connectivity. This divide is particularly pronounced in developing countries where economic constraints prevent a significant portion of the population from acquiring necessary technology. Nearly half of the world's population still lacks internet access, with the majority residing in low-income and rural areas (ITU, 2021). Factors such as high costs of devices, expensive internet plans, and lack of infrastructure contribute to this divide. Furthermore, even when physical access is available, individuals may lack the necessary skills to effectively use these technologies (Taylor, 2024). A specific example of this can be seen in India. Despite being one of the fastest-growing digital markets, a significant portion of the Indian population still lacks

access to the internet. According to the Telecom Regulatory Authority of India (TRAI), as of 2021, around 50% of the population did not have access to the internet. This digital exclusion is more pronounced in rural areas, where internet penetration is significantly lower compared to urban regions.

The **use divide** focuses on the disparities in digital skills among different groups. This divide is characterized by the varying levels of competency in using digital tools and accessing online resources. A significant aspect of the use divide is the generation gap, where younger individuals tend to possess higher digital literacy compared to older generations. This gap is often influenced by the quality of education and exposure to digital technologies. Studies show that digital literacy is higher among those with more formal education and among younger people who have grown up with technology (Robinson et al., 2015). For instance, In South Africa, the use divide is particularly pronounced. Despite improvements in digital access, significant disparities in digital literacy remain. There is a notable gap in digital skills between urban and rural populations, as well as between age groups and socio-economic classes (Research ICT Africa, 2021). A specific study highlights that in rural South Africa, only 32% of adults were comfortable using a computer, compared to 74% in urban areas (Gillwald et al., 2018). Moreover, the lack of tailored digital literacy programs for older adults further sharpens the use divide.

The **quality-of-use gap** delves deeper into how effectively individuals make use of digital technologies and the internet. This divide highlights that simply having access to digital tools is not enough; the ability to use these tools for meaningful and productive purposes is equally important. The quality-of-use gap is concerned with how users interact with the internet, the depth of their engagement, and their ability to use digital resources to improve their lives. For instance, some users may only use the internet for basic tasks like social media and entertainment, while others effectively use it for education, professional development, and accessing information (DiMaggio et al., 2004). Rwanda offers a compelling example of efforts to address the quality-of-use gap. Despite achieving impressive levels of mobile internet coverage - over 97% 4G coverage by 2020 through partnerships with companies like Korea Telecom - a great portion of the population remains unable to utilize these services effectively (Carnegie Endowment for International Peace, 2022). This shows that improving infrastructure alone is not enough

to bridge the digital divide.

Authors like Yvonne Ai-Chi Loh and Arul Chib (2022) introduce the concept of the **capability divide**, which focuses on how individuals can transform access into effective use and benefits. This divide considers not just the skills to use digital tools but also the ability to apply them in ways that significantly improve one's quality of life. This includes the ability to find employment, access healthcare, and participate in civic activities. The capability divide emphasizes that having the skills to use technology does not necessarily translate into meaningful engagement without the appropriate opportunities and support.

Similar to the latter, the **efficiency divide**, highlights the differential outcomes in the returns from using digital technology. This concept addresses how effectively different users can translate digital access and skills into tangible benefits such as improved economic opportunities or social inclusion. Regions or individuals with better digital infrastructure and higher digital literacy can derive greater benefits from technology, thus widening the gap between those who can and cannot effectively use digital tools for their advancement (He & Xu, 2023).

As it can be seen, the different types of divides underscore the major problem that the digital divide poses. All type's causes are interrelated which makes the concept more difficult to grasp and define. It is a multifaceted issue encompassing access, usage, capabilities and outcomes.

## **6. THEORETICAL FRAMEWORK**

### **6.1. Digitalization and change of paradigm.**

The historical evolution of digital technology, especially the internet and social media, has entailed a great change of paradigm and the way societies communicate, interact and access information. This section will delve deeper on this transformation and its impact in relation to the digital divide.

The origins of the internet go back to the 1960s with the development of ARPANET by the United States Department of Defence. It was designed to facilitate the communication

between institutions of investigation (Leiner et al., 2009). This innovation set the bases for future developments, moving from specific and isolated networks to a globally interconnected web.

The introduction of the World Wide Web by Tim Berners-Lee in 1989 revolutionized the use of internet. The web facilitated the navigation and access to information through hyperlinks and web browsers (Berners-Lee, 1990). During this period, key actors were created such as the Netscape, that popularized the web for personal and commercial use.

The early years of the 2000s set the dawn of social media platforms, radically altering digital communication. MySpace and Friendster were some of the first platforms to allow users to create profiles and interact with others (Boyd and Ellison, 2007). These were followed by Facebook, which was launched on 2004, and established the bases for the future online interactions. The introduction of smartphones in the late 2000s brought a significant shift in how people accessed the internet. Apple's iPhone, launched in 2007, combined telephony with internet browsing, bringing the power of the internet in users' pockets. This mobile revolution brought by the rise of mobile applications and social media platforms like Instagram and WhatsApp, which used mobile technology to enhance user engagement (Maryville University, 2021).

Social media platforms have grown exponentially, both in user base and influence. As of April 2024 there are 5.07 billion social media users around the world which equates to a 62.6% of the total global population (DataReportal, 2024, a.), having the "typical" user spend an average of 2 hours and 23 minutes per day on these platforms (DataReportal, 2024, b.). Not only have they changed personal communication but also business practices and political landscapes. For instance, the role of social media in political campaigns and social movements has been profound, as seen in recent events like the Arab Spring and the 2016 US presidential election (Aral, 2020).

This rapid evolution of digital technologies has brought challenges, including those of digital addiction and mental health issues. In fact, studies have shown correlations between excessive use of digital devices and symptoms such as attention deficit hyperactivity disorder (ADHD) (Keles et al., 2019). For instance, one major issue is the pressure to maintain an ideal online persona, which can lead to decreased self-esteem and increased anxiety, as individuals strive to present a perfect image (Turkle, 2011). This is particularly evident among teenagers, who experience "context collapse," where the

boundaries between different social contexts are blurred, making it challenging to manage their online image and deal with social interactions effectively (boyd, 2014). Furthermore, the phenomenon of constantly sharing the present moment has been linked to negative impacts on mental health, especially among young people (Twenge, 2017). This is deeply concerning as younger generations are growing increasingly isolated and social media dependent, thus globally further widening the above-mentioned capability (Ai-Chi Loh and Chi, 2022) and quality of use divides.



*Figure 2 A picture of a picture's picture for social media*

*Komodo island, Indonesia. December 2023.*

*Source: author's own*

## 6.2. Unequal digitalization processes: barriers to the digitalization of the Global South

However, this process of digitalization had a different pace on the global north than on the global south <sup>1</sup>. The experience of the former was generalized and rapid, encouraged by powerful infrastructure, high investment in technology and supportive policies, which achieved an almost universal presence of the internet (World Bank, 2024). Furthermore,

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<sup>1</sup> In this paper the term global south mainly alludes to countries in Africa and Southeast Asia



education on technological skills and digital literacy have been embedded in academic systems since the birth of digital technologies, facilitating their effective use and adoption. Conversely, the digitalization process has been (and it is) considerably slower in the global south due to several barriers that will be detailed below. In fact, of the 2.9 billion offline people, 96% live in developing countries (ITU, 2021).

There are several barriers that keep these countries from adapting faster to this change of paradigm. First, **insufficient infrastructure** as many rural areas lack the necessary access to broadband high speed networks, which limits users' capacity to make use of all the benefits of digital media. According to the World Bank (2024), more than half of the population in low-income countries does not have access to high-speed internet.

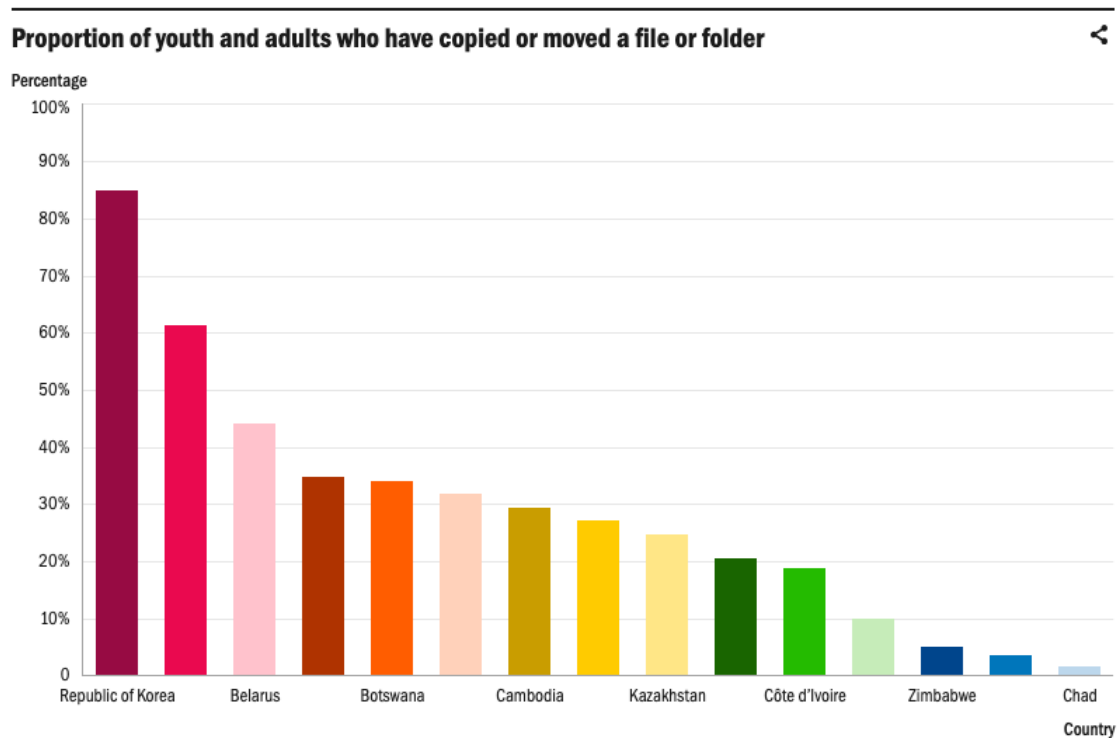
Furthermore, as mentioned above, even when general barriers of access are overcome, users may lack the skills to benefit from information and communication technologies (ICTs). **Digital illiteracy** still persists in many parts of the global south, hindering the integration of digital economy (Hanna, 2016). Furthermore, **language** also poses a great difficulty to digitalization, since local languages are frequently unavailable for exporting technologies. For instance, the Yoruba people in West Africa struggle to use ICTs as they rely on alphabetic literacy and are design in a foreign language (Heesen et al., 2019)

The **gender digital divide** highlights the disparities in ICT access and use between men and women and poses a further impediment to the homogenous digitalization of developing countries. Women often have lower ICT literacy rates and less ownership of devices, limiting their access (Chakravorti, 2017; ITU, 2017 as cited in Heesen et al., 2019) Patriarchal structures and cultural practices further restrict access by deeming internet content inappropriate for women and prioritizing household responsibilities over digital engagement (Majama, 2018). Moreover, it has been found that women tend to lack confidence when using ICTs, and that they frequently suffer from "technology-is-not-for-me syndrome" (Wakunuma, 2018 as cited in Heesen et al., 2019)

In numbers, in high-income countries, such as those in Europe and North America, digital literacy rates are generally high. For instance, in Europe, about 89% of the population uses internet and digital skills are well integrated into the education systems (Brookings, 2023). Conversely, in many countries of the Global South, digital literacy remains low,

in African countries such as the Central African Republic and Chad, less than 2.5% of adults possess basic digital skills such as copying or moving files. Even in more advanced economies such as Indonesia and Mexico, digital literacy is still low compared to that of the Global North, with less than 50% of students having access to the internet and a computer for schoolwork (Industrial Analytics Platform, 2023).

Table 1



Source: UNESCO Institute for Statistics (2022).

Source: Industrial Analytics Platform, 2023

The graph above shows the proportion of youth and adults who have copied or moved a file or folder. The differences are striking going from a 84.97% in South Korea, a 34.73% in Colombia (colour brown), a 20.51% in Thailand (colour dark green), a 9.9% in Nepal (colour lightest green) to a 1.6% in Chad.

A relevant question rose by Heesen et al. (2019) is that of **digital colonialism**. Although their paper “Ethical questions of digitalization in the Global South” is focused on the African region, this work believes their findings are of great relevance for its purpose and to further understand the barriers to the digitalization process of developing countries. Today, some of the most widely used ICT systems are produced by countries such as the

United States (Motorola), South Korea (Samsung) or China (Huawei). These companies have recognized the potential of countries of the global south and have tailored their products to meet their specific needs, such as developing longer-lasting batteries to address the frequent power shortages in many regions (Majama 2018, as cited in Heesen et al., 2019). However, by introducing these technologies into a culturally different context, these multinational corporations are also imposing their values through the design of their products. Thus, embedded in technology this facilitates the export of western values (with the corresponding risk of these conflicting with local cultures). Furthermore, the ICTs exported from the West or China may include biased algorithms and gender biases, exacerbating the digital divide. For instance, China's significant investment in African digitalization raises concerns about autonomy and freedom of expression, as an authoritarian regime, may support repressive practices by aligning with similarly authoritarian African governments (Majama, 2018; Wakunuma, 2018, as cited in Heesen et al., 2019). Overall, the political dynamics embedded in the technology development of the Global South rises several ethical concerns determined by unequal power relations, while aiming at reducing the digital divide, it can reinforce the dependency of Global South countries on those of the North, further strengthening the existing inequalities between both hemispheres

### 6.3. Knowledge gap Hypothesis

The information gap hypothesis it is a key theory to understand the disparities in access and use of the information of different socioeconomic groups. This hypothesis, originally proposed by Philip J. Tichenor, George A. Donohue and Clarice N. Olien in 1970, all three researchers at the University of Minnesota, suggests that *“as the infusion of mass media information into a social system increases higher socioeconomic status segments tend to acquire this information faster than lower socioeconomic status population segments. Hence the gap in knowledge between the two tends to increase rather than decrease”* (Communication Theory, 2016). In simple words, increased mass media information leads to wider knowledge gaps between individuals of different purchase power levels. Since we are now living the Information era, where information is power these differences are even more striking and have greater consequences.

This theory assumes a natural connection between economic status and education,

associating individuals with a higher purchasing power with a higher education and those with a lower purchasing power, with little or no education at all. This is linked directly with their capacity to understand and process information and enrich their knowledge, thus “like wealth, education, and many other things in life, mass media knowledge acquisition is distributed differentially through society” (Cheprasov, 2023, n.p). Historically, knowledge gaps were found to be smaller regarding local-level topics as societies felt more personally engaged with them (Hawng and Jeong, 2009 as cited in Lind and Boomgaarden, 2019), however this situation is changing as we live in a globalized world growing increasingly interconnected and people become more concerned of international issues. Moreover, the meta-analysis of this hypothesis by Lind and Boomgaarden (2019) further supports this theory by showing that while television tends to maintain existing knowledge gaps, print and online media widen them, highlighting the role of different media channels perpetuating these disparities. Furthermore, these authors also argue that topics with high public contestation, like climate change, can reduce the influence of education on knowledge levels. This insight may be crucial for policymakers to develop strategies that address not just access but also the critical engagement with digital content across different educational and socioeconomic groups.

The knowledge gap hypothesis provides a solid theoretical lens to analyse and understand how the disparities in education and socioeconomic status affect information acquisition in Indonesia and thus, the country’s digital divide. By applying this theory to Indonesia, this paper will attempt to analyse to what extent does the rapid digitalization process exacerbate existing inequalities in the country. A priori, urban areas with better educational infrastestructure and higher incomes are more likely to access and effectively use digital technologies, thus widening the knowledge gap between urban and rural populations. This analysis will help to identify the underlying factors contributing to the digital divide and shape strategies to bridge these gaps, aiming for a more equitable access to ICTs across different socio-economic groups.

## **7. ANALYSIS**

Indonesia poses a great case study to analyse the digital divide. Despite its significant advancements in digital infrastructure and increasing internet presence, there are stark

disparities in access and use of digital technologies across the country's different regions and demographic groups. This section will analyse these disparities through the lens of the Knowledge Gap Hypothesis, highlighting key factors such as education, employment and income equality and the role of the government in bridging this gap.

### 7.1.Indonesia: socioeconomic and political context

Indonesia, an archipelago in Southeast Asia made up of more than 17,000 islands, has established itself as one of the world's largest emerging economies. Below, is a general analysis of the current socioeconomic context of the country.

Regarding the economic context, Indonesia has maintained steady economic growth over the past two decades, with annual GDP averaging around 5%. According to the World Bank, Indonesia's GDP was approximately US\$1.1 trillion in 2022, making it the largest economy in Southeast Asia and 16th globally in terms of nominal GDP. Manufacturing, particularly automobile and textile production, along with mining (coal, oil and natural gas) are fundamental sectors for the Indonesian economy. Therefore, mining represents a significant portion of the country's exports.

Despite industrialization, agriculture remains vital, employing approximately 30% of the population. Indonesia is the largest producer of palm oil and a major producer of rice, rubber, coffee and cocoa. Additionally, the services sector, including tourism, finance and trade, has grown rapidly, contributing significantly to GDP. Finally, Indonesia has attracted significant foreign direct investment (FDI), particularly in manufacturing, infrastructure and mining sectors. In 2022, FDI reached 29.2 billion USD. In addition, the country is a member of the G20 and actively participates in international trade, with China, the United States and Japan as its main trading partners.

In the social sphere, with more than 273 million inhabitants, Indonesia is the fourth most populous country in the world. The population is young, with a median age of 30.2 years, which implies a significant and growing workforce. Despite economic growth, inequality and poverty remain major challenges. Indonesia's Gini coefficient was 38.2 in 2021, reflecting moderate inequality. Poverty has decreased, but approximately 10% of the population still lives below the national poverty line.

Indonesia has made progress in education, with literacy rates approaching 96%. However, educational quality and equitable access remain a great. In terms of health, the country faces challenges such as malnutrition and communicable diseases, although health insurance programs have been implemented to expand coverage.

Despite investments, infrastructure in many areas remains insufficient despite the government's efforts to prioritize infrastructure projects to improve connectivity and support economic growth. Moreover, corruption remains a persistent problem that affects government efficiency and investor confidence. The country's vulnerability towards climate change is also an issue. Furthermore, Indonesia multifaceted composition is another key aspect regarding the digital divide within the country. In this line, it is made up of more than 17,000 islands, of which approximately 6,000 are inhabited. Among the most important islands are Sumatra, Java, Borneo (Kalimantan), Sulawesi and New Guinea (Papua). Each of these islands presents a rich cultural and ethnic diversity, which contributes significantly to the socio-political and economic complexity of the country.

There is a variety of ethnic groups, each with their own language, customs and traditions. Firstly, the Javanese constitute the largest ethnic group, representing approximately 40% of the total population of Indonesia. They reside mainly on the island of Java, which is the most populated island and the political and economic center of the country. The Sundanese are the second largest ethnic group. The Batanks, on the other hand, are an important group in North Sumatra, known for their unique cultural and religious traditions, as well as the Dayaks. Finally, the Papuans on the island of New Guinea, in the provinces of Papua and West Papua, they represent one of the oldest and most diverse cultures in the world, with hundreds of different languages and dialects. This variety poses several challenges regarding infrastructure development and internet access and provision. Therefore, the vast geographic dispersion of the islands makes it difficult to implement a cohesive telecommunications infrastructure as many islands have mountainous or jungle land, which complicates the construction of the necessary infrastructure for adequate internet coverage. For example, the island of Papua has areas that are difficult to access due to its dense rainforest and high mountains. Finally, the enormous ethnic, cultural and linguistic diversity also influences the implementation of internet services, since solutions must be culturally sensitive and accessible in multiple languages.

In short, Indonesia's socioeconomic context is complex and multifaceted, marked by robust economic growth and a dynamic population, but also by significant challenges in terms of inequality, infrastructure development and access to the Internet.

## 7.2. Digital Infrastructure and Internet access across the country

Indonesia, although having the largest population of internet users, its internet penetration rate of 51% is under the regional average of 53% (We Are Social, 2017 as cited in Onitsuka et al., 2018). The country's digital infrastructure and internet access distribution show significant disparities across its different islands, highlighting the complexity of addressing the digital divide in this archipelago nation. Java, the most populous and economically advanced island, enjoys the highest level of internet penetration, with approximately 89% of its population having access to internet connection. This is due to robust infrastructure and urban concentration in cities like Jakarta and Surabaya (Makmuri, 2017). However, in stark contrast, Papua, one of the least developed regions, suffers from severe infrastructural deficits, with internet penetration rates as low as 30%. The region's challenging land and low economic development hinder the installation of the necessary digital infrastructure (Tohari, 2023). Similarly, Kalimantan and parts of Sumatra face significant challenges. While the former has seen some improvements, internet access remains around 40-50%, reflecting the broader issues of connectivity in rural and less developed areas (Makmuri, 2017). Bali, although smaller in population, has relatively better internet access due to its status as a major tourist destination, which has driven investments in digital infrastructure. However, regions like Nusa Tenggara and Maluku lag significantly behind, with internet penetration rates often below 50%, deepened by economic constraints and logistical challenges. For instance, East Nusa Tenggara has struggled with low levels of digital infrastructure investment, resulting in only 43% of the population having internet access (East Ventures, 2023).

The map below shows a distribution of Indonesia's Development Index (IDI) between the period of 2015 and 2019, to illustrate the above-mentioned<sup>2</sup>.

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<sup>2</sup> Please note that the author of this work has added name labels on the islands in order to facilitate the reader's task.

Table 2

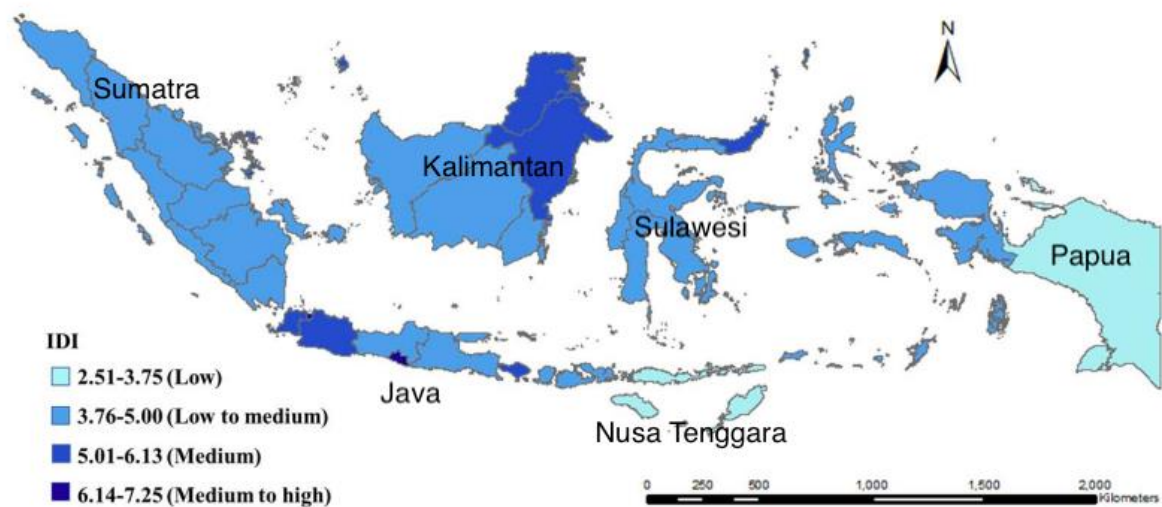


Figure 3. Distribution of IDI across provinces in 2015-2019 (average values)

*Source: Ramadahanti and Astuti, 2022*

To address these disparities, has launched diverse programs - which will be discussed further on – such as the Palapa ring Project that have improved the connectivity among rural villages allowing them to use ICT for market expansion, equipment purchases, information gathering and social media use. Nevertheless, despite the progress, the lack of wired internet infrastructure remains a challenge and many academics claim for the need to focus on the impacts of ICT post-penetration in rural communities across the country (Sitti, Achsin & Andi, 2015; Yuniadi, 2016 as cited in Onitsuka, 2018, p.3)

In addition, Ariansyah et al. (2019) carry out a survey 14 different provinces across Indonesia. They analyzed several variables but for space purposes this work will only mention two: information and communication skills, referring to the use type of digital divide explained above. This survey evidenced that regarding these skills there is a striking difference between South and North Sumatra, Papua and West Papua, West, South and Central Sulawesi and Jakarta and Yogyakarta, in Java, and Bali. The former areas lack strong internet connection, suffer from frequent power cuts and have a greater rural population. Furthermore, as the authors mention there is a possibility that people do not have a particular ICT skill because they are unaware of the benefits of ICT (p.5), therefore they do not try to learn it. Thus, the issue is not only the lack of access but the lack of motivation to use it.



Furthermore, and making reference to the capability type of divide, this survey also revealed that many respondents believed that ICT only has an unproductive use such as entertainment or social media (p.5), this brings to light the importance of developing strategies to increase public awareness of the varied benefits and possibilities of ICT use and access, and how having those skills can be applied in productive ways that can improve one's quality of life.

It is also important to mention that indigenous communities such as the Mentawai or the Sulawesi who live in the depths of the jungle lack any type of ICT – and even electricity – access. Although many from the new generations are now moving to live to the villages, those who stay, remain isolated from the modern world as they do not even have access to printed media. This, while opening the debate on whether they are choosing the life they are living, which will not be further discussed in this paper, it is undisputed that this isolation from information and ICT use and access, seen from the lense of the Knowledge Gap Hypothesis, widens the digital divide.



*Figure 3 Clara staying with Thina's family*

*Muntei, Mentawai, Sumatra, Indonesia*

*Source: author's own*

### 7.3. Education

The digital divide in Indonesia profoundly affects the field of education, creating significant disparities in access to and quality of education. While urban areas with solid digital infrastructure enjoy advanced educational resources and technologies, rural and remote regions, as we have seen, often lack basic internet access and digital tools, further widening educational inequalities. This section will delve into the effects of the digital divide in education and the consequences of these may have on the country.

One of the most evident effects of the digital divide is the **unequal access to educational resources**. Students in urban areas, where internet penetration and digital infrastructure are robust, have access to a wide range of online learning platforms, digital libraries, and educational apps. These resources provide supplementary learning materials, interactive content, and opportunities for self-paced learning, which enhance the overall educational experience. In contrast, students in rural and remote areas face significant challenges in accessing these digital resources. This digital exclusion means that many students in these areas rely solely on traditional teaching methods and have limited access to up-to-date information and diverse learning tools. For instance, during the COVID-19 pandemic, the shift to online learning highlighted these disparities, with many rural students unable to participate in virtual classes due to lack of internet access and digital devices in many parts of Papua and Nusa Tenggara.

Students with access to digital technologies tend to **perform better academically** and are more engaged in their learning. Studies have shown that students who use digital learning tools in the classroom are generally more engaged and achieve better academic outcomes compared to those who do not (McKinsey, 2018). Similarly, a UNICEF report highlighted that integrating technology in education can lead to improved cognitive competencies and better academic performance (UNICEF, 2020). In urban schools with good digital infrastructure, teachers can incorporate multimedia content and online quizzes to make their lessons more interactive, which can improve student understanding and retention of complex concepts. However, in rural schools, the lack of digital resources often leads to lower student engagement and academic performance. Students in rural Indonesia score significantly lower in standardized tests compared to their urban counterparts, partly due to the limited use of digital technologies in their education (World

Bank, 2021).

The digital divide further affects **access to higher education**, particularly for students from rural and disadvantaged backgrounds. Online platforms and digital applications are increasingly used for university admissions, scholarships, and entrance exams. Students with reliable internet access can easily apply to universities, access preparatory materials, and participate in online entrance tests. However, students in rural areas often face barriers in accessing these online resources, limiting their chances of securing admission to higher education institutions. Thus, the effects of the digital divide in education are striking since it favours the unequal formation for future professionals, preestablishing a disadvantaged path for those without access and use of digital platforms.

The use type of digital divide, regarding the **generation gap**, is one that severely impacts on education. For instance, in Universitas Gadjah Mada in Yogyakarta, every module counts with two teachers: one professor and one professor's assistant. The latter are often students whose task is to take care of all the technological inputs of the class such as other online campus, connecting the presentations in class and sending them to the students, publishing the marks online. In short, they serve as the digital bridge between the professor and the students. Although their role is key and it is a great solution to this generational divide, not every educational institution from schools to universities count with the same resources (not only in economic terms but also in terms of geography and infrastructure). Rusdin et al. (2023) carried out a study to analyse Indonesian high school teachers' views on media education. They did a survey across both private and public high schools in Central Sulawesi, a region that we have seen to lack ICT skills and connectivity. Their study indicated that a significant proportion of teachers claimed to having faced obstacles such as limited access to reliable technology, lack of appropriate resources and difficulty adapting to new media technology (Rusdin et al., 2023, p.8). This shows that the disparities in access and use of ICTs have a direct impact on education.



*Figure 4 Clara and her classmates*

*Universitas Gadajh Mada, Yogyakarta Special Region, Indonesia*

*Source: author's own*

#### 7.4. Employment and Income inequality

The digital divide in Indonesia has profound implications for employment and income inequality, deepening the socio-economic disparities between those who have access to digital technologies and those who do not. This divide affects various aspects of economic life, including skill acquisition, business opportunities, wage levels, and regional development, ultimately contributing to a cycle of poverty and limiting upward scalation for many Indonesians.

One of the most critical impacts of the digital divide is the disparity in **digital skills** between high-skilled and low-skilled workers. Workers with access to digital technologies and internet are more likely to develop essential digital skills that increase their employability opportunities in high-paying jobs. These digital skills include proficiency in using software applications, data analysis, digital marketing, and e-commerce, which are highly valued in the digitalized economy market. In contrast, those

without access to digital technologies are confined to low-skilled jobs with limited prospects for advancement. According to the International Labour Organization (ILO), workers in the tech and information sectors in Indonesia earn, on average, 2-3 times more than those in traditional sectors such as agriculture and manufacturing (ILO, 2021). Thus, this wage gap highlights the economic disadvantage faced by individuals without digital skills. Moreover, the digital divide also affects access to education and training programs that can help bridge the skills gap. Furthermore, online learning platforms and digital training resources are often unavailable to those in rural and remote areas, limiting their ability to acquire new skills and improve their employability. The Ministry of Education and Culture has noted that students in rural areas face significant challenges in accessing online education, further perpetuating the cycle of low skills and low wages (Ministry of Education and Culture, 2021). In addition, this disparity in digital skills tends to be passed on from one generation to another since a big part of the economy of Indonesia is circular, consisting of family owned warungs (small shops and eateries) with no vision towards modernization. This lack of digital input and information keeps these families in an *unawareness trap*, this meaning, having no conscience of the sole possibility of changing their business model and adapt to a constantly changing market. The disparity in digital skills between high-skilled and low-skilled workers aligns with the Knowledge Gap Hypothesis. Workers with digital access acquire skills that lead to higher-paying jobs, while those without access remain in low-skilled, low-paying positions. This reinforces the socio-economic stratification predicted by the hypothesis.



*Figure 5 Clara with Mba Yuli and her daughter (17 years old)*

*Yogyakarta Special region Indonesia*

*Source: author's own*

The digital divide also **restricts access to online business opportunities**, which are crucial for economic growth and income generation. Entrepreneurs and small business owners in digitally connected areas can make use of e-commerce platforms to expand their market reach, increase sales, and boost profits. These platforms provide access to a broader customer base, enabling businesses to grow beyond their local markets. In contrast, those in rural or underserved regions struggle to access these opportunities due to poor internet connectivity and limited digital literacy. A report by the Asian Development Bank (ADB) indicates that only 30% of small and medium enterprises (SMEs) in rural Indonesia engage in online business activities, compared to 70% in urban areas (ADB, 2022). This limited access to online markets restricts business growth and income generation for rural entrepreneurs. The limited access to online business opportunities seen through the Lense of the Knowledge Gap Hypothesis shows how it can result in an uneven distribution of economic benefits, perpetuating income inequality.

Moreover, **non-digitalized sectors**, where workers often lack access to digital tools and technologies, tend to offer **lower wages** compared to digitalized industries. Sectors such as agriculture, which employ a significant portion of Indonesia's rural population, have not benefited from the productivity gains associated with digital technologies. According to the World Bank, agricultural workers in Indonesia earn an average monthly wage of \$150, compared to \$400 for workers in the digital economy (World Bank, 2021). This income disparity underscores the economic disadvantage faced by workers in non-digitalized sectors. Furthermore, non-digitalized sectors are more vulnerable to economic shocks and disruptions. For instance, during the COVID-19 pandemic, many businesses in non-digitalized sectors struggled to adapt to remote work and e-commerce, resulting in significant income losses and job insecurity. In contrast, businesses in digitalized sectors were better equipped to transition to remote operations, mitigating the economic impact of the pandemic. For example, many local markets in rural Java saw a sharp decline in customer traffic, leading to reduced sales and income. Without access to digital platforms, these businesses were unable to pivot to online sales, resulting in significant income losses and heightened job insecurity for employees (Mukaromah & Sakti, 2020). Conversely, large e-commerce platforms like Tokopedia and Bukalapak saw a surge in online transactions as consumers shifted to online shopping, helping them maintain business continuity and even expand their customer base (Budi, 2020). The lower wages in non-digitalized sectors and the regional disparities in digital infrastructure further illustrate the Knowledge Gap Hypothesis. Regions with robust digital infrastructure attract more investments and high-paying jobs, leaving less connected regions behind. This creates a cycle where digitally advanced areas continue to progress, while others stagnate.





*Figure 6 Pasar kolombo (Colombo local Market)*

*Yogyakarta Special region, Indonesia*

*Source: author's own*

The digital divide also has a **gendered dimension**, affecting women disproportionately. Women in rural areas are less likely to have access to digital technologies and the internet, limiting their employment opportunities and earning potential. According to a report by the United Nations Development Programme (UNDP), only 35% of women in rural Indonesia use the internet, compared to 65% of men (UNDP, 2021). This gender gap in digital access contributes to broader gender income inequality. Women in rural areas often face additional barriers to digital access, such as cultural norms and domestic responsibilities that limit their time and mobility. As a result, they have fewer opportunities to engage in digital learning, start online businesses, or secure high-paying jobs in the digital economy. Addressing this gender digital divide is crucial for promoting gender equality and empowering women economically. The gendered impact of the digital divide also fits within the Knowledge Gap Hypothesis framework. Women in rural areas, who already face socio-economic disadvantages, are further marginalized by



limited digital access. This lack of access prevents them from acquiring digital skills and benefiting from online opportunities, exacerbating gender income inequality.

#### 7.5. The role of the government

Despite the striking digital disparities existing in the country, the Indonesian government is committed to leveraging digital technologies to enhance socio-economic development. Thus, various governmental policies and regulations have been implemented to bridge the gap between rural and urban areas.

Key regulations include the 2014 Presidential Regulation No. 96, which details a national bandwidth plan to build digital infrastructure for economic growth and national sovereignty. The 2018 Presidential Regulation No. 95 introduces the Electronic-based Governing System (SPBE), promoting interconnectivity among government agencies to improve governance efficiency. Additionally, the 2019 Presidential Regulation No. 39 focuses on the production and dissemination of high-quality, integrated data, enhancing data governance standards and interoperability. These policies are part of the National Medium-Term Development Plan 2020-2040, specified in the 2020 Presidential Regulation No. 18, which identifies digital transformation as a key driver of sustainable economic and social progress. The Government Work Plan 2023 prioritizes Digital Transformation to increase the efficiency, accessibility, and flexibility of education, with a goal of providing 90% of schools nationwide with internet access by 2024 (Kementerian PPN/Bappenas, 2023 as cited in UNESCO, 2023). This ambitious plan aims to make use of technology to foster widespread connectivity and empower students, envisioning a future where technology is seamlessly integrated into education, creating an inclusive and dynamic learning environment (UNESCO, 2023, p.30). Furthermore, although the State Revenue and Expenditure Budget allocated twenty percent of state spending to the education sector, the government of Indonesia has acknowledged the importance of incorporating ICT into its education system and as a result, the National ICT Council was formed in 2006 with the goal of advancing e-education. Nevertheless, the verbal commitment to incorporating digital technology into the education system has not been implemented into effective financial commitments.

Additionally, Minister of Communication and Informatics Regulation No. 13 of 2019 has

implemented regulations in line with the national mid-term plan for the communication and information sector for 2020–2024. The primary subject of this regulation is telecommunications services broadly across the country. Internet-based application services include a range of communication channels, including email, instant messaging, audio, text, and video communications; they also include data storage, search engines, gaming, and social media. These services rely on telecommunications networks to deliver Internet access. Moreover, as an attempt to ensure ICT access across the different islands, Ministerial Regulation Number 5 of 2020, published by the Ministry of Communication and Information (MCI), stipulates that all private electronic system operators (ESOs) in Indonesia must be accessible. This rule is applicable to several platforms, such as social media, digital marketplaces, messaging service providers, search engines, financial services, data processing services, messaging apps, video calls, and games (UNESCO, 2023, p 37-38). However, it is worth mentioning that despite the above-mentioned efforts, the digital divide remains a pressing issue in the country (Indrawatti, 2023)

Another major advancement is The Palapa Ring Project, which was completed in 2020 and aimed at providing the country with 4G internet access through land and under-sea cables. With a cost of 1.5 billion US dollars, the project consists of 35.000km of under-sea fiber optic cables and 21.000 km of land cables, crossing the country from west to east. The project was divided into three regions and by 2018 the two first were completed, being the final project completed in 2019, which is a striking short period and demonstrates the government's determination of bridging the country's digital gap (ASEAN Briefing, 2020). In 2019, the country's internet penetration was of 64% and it has hit 79.5% in 2024 based on the latest survey of the Indonesian Internet Service Providers Association (APJII) (Antara, 2024)

Nevertheless, and building up on the aforementioned survey carried out by Rusdin et al. (2023), many teachers appeared to lack institutional support to implement digital technologies in the classrooms. Therefore, although the government claims to acknowledge the importance of ICT use in education and the effort to invest in digital literacy, it does not seem to be an integrated communication between the government and institutions.

## 8. CONCLUSION

It seems clear that the digitalization process on the Global North and South goes at a different pace, however this study believes that the change of paradigm has affected both, as what occurs in the former will immediately – and often drastically – repercuss on the latter. Thus, Indonesia with its vast dimension and demographic and geographic variety and complexities has been – at clearly still is – struggling to adapt to the world's digitalization. The sudden injection of ICTs and the digital divide as its major consequence illustrates the Knowledge Gap Hypothesis, which highlights how the existing disparities in access and use of ICTs impact on education and employment opportunities, reinforce existing socio-economic stratification.

The research reveals that students in urban areas with robust digital infrastructure benefit significantly from access to online educational resources, enhancing their academic performance and engagement, while those in rural areas struggle from the opposite luck. This digital exclusion not only affects current educational outcomes but also limits future opportunities for higher education and upward mobility, perpetuating the cycle of poverty.

The impact of the digital divide on employment and income inequality is equally profound. High-skilled workers with access to digital technologies enjoy better job opportunities and higher wages, while low-skilled workers remain confined to low-paying jobs with limited prospects for advancement. The disparity is further compounded by limited access to online business opportunities for entrepreneurs in rural areas, restricting economic growth and income generation. Women, particularly in rural areas, face additional barriers to digital access, exacerbating gender income inequality.

The lack of motivation of some individuals in rural regions to use ICTs despite having access to them, shines light upon the issue of digital poverty trap in which some areas have fallen. Thus, to effectively bridge this gap, it is not sufficient to implement new policies and programs alone. There must be ongoing communication and collaboration between the government, educational institutions, and local communities. Emphasizing education and digital literacy, rather than just providing access to digital technologies, is crucial. Comprehensive strategies that address both access and the critical engagement

with digital content are essential for fostering digital inclusion and ensuring equitable growth and development in Indonesia.

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