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Analyzing the Impact of the Digital Divide on Individuals, Families, and Society: A Technological Perspective

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Abstract. The digital divide, a global issue shaped by disparities in access to information and communication technologies (ICTs), has far-reaching implications for individuals, societies, and economies. This paper explores the roots and impacts of the digital divide, emphasizing the economic, social, and cultural inequalities it perpetuates between developed and developing nations and within different demographic groups. Key areas of concern include the imbalance in digital infrastructure, digital literacy, and affordability, which hinder equitable access to education, employment, and democratic participation. The paper also examines the role of digital hegemony, economic polarization, and the Matthew Effect in widening this gap while highlighting the societal and cultural challenges, such as linguistic and ethnic divides. To address these challenges, the paper proposes strategies focusing on infrastructure development, affordable technology, digital literacy promotion, and robust ICT regulations. Bridging the digital divide offers significant opportunities for fostering socioeconomic development, reducing global inequalities, and enhancing democratic engagement. This study underscores the need for collaborative efforts from governments, private enterprises, and international organizations to create a more inclusive and equitable digital future.

Keywords: digital divide, digital literacy, ICT Access, socioeconomic inequality, infrastructure development

1. Introduction

Since the 1990s, the prosperity of information technology has driven unprecedented growth in the Internet industry, fundamentally reshaping societies and economies worldwide. The advent of globalization has transformed digital tools, such as cell phones, from optional luxuries into necessities for daily life. Concurrently, information literacy has emerged as a critical competency for individuals navigating diverse professional fields. While these technological advancements have revolutionized communication, work, and education, they have also illuminated significant inequalities in digital infrastructure and resource access. This phenomenon, widely called the digital divide, has become a focal point of academic inquiry due to its profound implications for global equity and development.

The Organization for Economic Cooperation and Development (OECD) defines the digital divide as disparities in access to information and communication technologies (ICTs), as well as differences in the capacity to utilize these technologies effectively across socioeconomic groups, businesses, households, and regions [10]. Meanwhile, the National Telecommunications and Information Administration (NTIA) adopts a more resource-oriented perspective, describing the digital divide as the gap between those who are "information-rich" and those who are "information-poor" [13]. Both definitions highlight access disparities and inequities in the ability to derive meaningful benefits from digital technology.

The digital divide represents a significant aspect of North-South dialogues, arising from pronounced disparities between developed and developing countries regarding technological infrastructure, economic capacity, and educational opportunities. However, this divide transcends the international context, manifesting within nations where access to digital resources is influenced by intersecting factors such as income, education, race, geography, and age. These internal disparities are particularly pronounced in low-income or rural regions, where a lack of infrastructure and digital literacy limits the digital economy's opportunities.

Moreover, the digital divide exacerbates existing social inequalities by perpetuating economic development, educational attainment, and social mobility gaps. For instance, individuals with limited or no access to ICTs are often excluded from critical digital platforms, such as online learning, telehealth services, and e-commerce, further widening socioeconomic gaps. As a result, understanding the digital divide is essential for addressing structural inequalities and fostering inclusive development at both global and domestic levels.

This paper aims to explore the multifaceted nature of the digital divide, examining its causes, manifestations, and consequences at both international and domestic scales. By analyzing the key drivers of this phenomenon, including socioeconomic factors, technological advancements, and policy frameworks, this research seeks to contribute to the ongoing dialogue on bridging the digital divide and promoting equitable access to digital resources in an increasingly interconnected world.

2. Analysis of the Technology Landscape between Developed and Developing Countries

The international digital divide arises from the broader economic gap, reflecting labor division and status disparities within the global industrial chain. Developed countries dominate as leading producers and primary consumers of digital technologies, while developing nations are often relegated to the role of technology adopters. This imbalance has contributed to what is commonly called the "rich country phenomenon," where developed nations significantly outperform developing countries in terms of technological capacity and infrastructure.

For instance, at the start of the 21st century, 95.6% of the world's Internet hosts were concentrated in OECD countries, with the number of hosts per capita in these nations being 96 times higher than in developing countries [1]. Beyond Internet hosts, OECD countries also held a substantial advantage in IT infrastructure, technical personnel, and scientists. The resulting inequality in global technology distribution far exceeded even disparities in income levels [12]. As shown in Table 1, by the end of 2022, Internet penetration in developed countries reached 93.1%, compared to only 53.6% in developing countries [2]. Similarly, smartphone usage rates in developed nations averaged over 85%, while in developing countries, they remained at just 43% [2].

Table 1. Comparison of IT resource investment by region

Region	Information infrastructure spending per capita(USD)	R&D investment as a percentage of GDP(%)	Number of technical personnel(10,000)
OECD Countries	129.11	1.8	1326.1
Latin America and the Caribbean	28.28	0.5	205.4
Eastern Europe Transition Countries	22.89	0.9	577.2
Middle East and North Africa	19.93	0.4	177.8
East Asia	13.49	0.8	235.8
South Asia	13.49	0.8	59.5
Sahara and Southern Africa	11.56	0.2	76.1

Despite progress in expanding network access globally, a persistent gap remains between developed and developing countries regarding information processing capabilities. This gap is often exacerbated by barriers such as language and educational disparities, which make overcoming the "digital divide" particularly challenging. For example, within OECD nations in 2000, the difference in computer ownership between high- and low-income residents was less than sevenfold [12]. However, in countries like Panama and South Africa, the highest-income groups owned significantly more telecommunication devices than their lowest-income counterparts. Similarly, by 2000, the United States held a distinct advantage in global digital data and information, accounting for most Internet users, email users, and e-commerce activity worldwide.

Furthermore, disparities in innovation and research capabilities contribute to the digital divide. By 2019, the United States, Japan, South Korea, and China collectively accounted for 75.5% of global patent applications [7]. Developed countries also lead in frontier technology domains such as data analytics and artificial intelligence (AI), supported by long-term investments in educational resources, technical expertise, and extensive databases. For instance, North America and Europe produced 68% of global academic papers on AI in 2019, far surpassing the contributions of developing nations [12].

3. Impact of the Digital Divide on Human Development

The digital divide significantly impacts individuals in developing and developed countries, shaping their access to information, education, and social opportunities. In developing countries, low Internet penetration, limited mobile device ownership, and weak digital skills hinder access to up-to-date information, exacerbating gaps in educational attainment and deepening inequalities on a macro scale. As shown in Table 2, many residents in these regions continue to rely on traditional media, such as television, radio, and newspapers. These sources, while accessible, lack the interactive, instantaneous, and rich informational capabilities of digital platforms. According to the International Telecommunication Union (ITU), Internet penetration in developing countries was only 47% in 2019, compared to over 90% in developed nations [8].

In addition to limited infrastructure, residents in developing countries face challenges related to digital skills. Basic competencies in using electronic devices, filtering information, and applying digital tools effectively still need to be developed. According to UNESCO, digital skills education in developing countries generally needs to catch up to global standards, leaving most residents unable to use the Internet effectively [14]. This deficiency widens the "data divide," limiting their ability to participate fully in the digital economy and knowledge society.

Table 2. The level of information development of each

Category	Countries / Economies
Skater	Sweden, USA, Finland, Norway, Denmark, Canada, Netherlands, Switzerland, Australia, Japan, Singapore, UK, Germany
Strider	Hong Kong, Belgium, Austria, New Zealand, Taiwan, Ireland, Israel, France, Korea, Italy, Spain, Portugal, UAE, Czech Republic, Hungary, Greece
Sprinter	Poland, Romania, Chile, Argentina, Malaysia, Russia, Brazil, Turkey, Philippines, Thailand
Stroller	Jordan, Egypt, China, Indonesia, India, Pakistan

3.1. Knowledge and Technology Divide

The digital divide contributes to a broader knowledge and technology divide, as unequal access to information reinforces disparities in education and societal knowledge levels. Education and knowledge acquisition rely heavily on access to digital tools and platforms. In developing countries, limited Internet penetration constrains individuals' ability to seek and use information, further hampering educational opportunities. For instance, UNESCO reports that in 2019, the average number of years of education in developing countries was only half that of developed nations [9].

This information inequality exacerbates gaps between the rich and poor within developing countries, potentially creating new social stratification. Wealthier groups, with greater access to real-time, diverse digital resources, gain advantages in education, employment, and social mobility. Meanwhile, lower-income populations, who rely on traditional and limited sources of information, remain at a disadvantage. This inequality highlights how unequal access to information is critical to societal division and reinforces systemic disparities between developing and developed nations.

3.2. Impact On Developed Countries

While the digital divide is most pronounced in developing regions, it has significant implications within developed countries despite their technological advantages. Inequalities persist between information-powerful groups—urban residents, the highly educated, and high-income earners—and information-disadvantaged groups, such as rural residents, those with low educational attainment, and low-income individuals. The former groups possess superior access to technology, advanced digital literacy, and the ability to integrate IT into their work and lives. Conversely, the latter struggle to utilize technology effectively, often remaining on the periphery of the digital economy.

One notable manifestation of the digital divide in developed countries is the intergenerational divide. Older adults, particularly those aged 65 and above, face challenges in accessing and using digital tools, largely due to resource constraints and educational differences. For example, in 2019, Eurostat reported that while 98% of EU residents aged 15–24 used the Internet, only 50% of those aged 65+ were regular Internet users [16]. This gap restricts older adults' social participation and access to essential digital services, ultimately diminishing their quality of life.

3.3. The Gender Divide

The digital divide also manifests in gender disparities globally. While access to the Internet and digital tools has improved worldwide, significant gender gaps persist, reflecting deeper sociocultural inequalities. As of 2019, global Internet usage was 75% among males and 72% among females, indicating a noticeable gender divide [17]. While the gap may appear small, its implications are profound. Gender disparities in access, digital skills, and usage affect women’s ability to leverage technology for education, employment, and social engagement.

This gender divide is not merely a result of unequal technological access but is deeply intertwined with broader societal factors. These include inequitable allocation of educational resources, socioeconomic structures, and cultural perceptions of gender roles. For instance, women in many developing regions face structural barriers to education and digital training, limiting their ability to participate in the digital economy. Addressing the gender divide requires technological solutions and broader social and policy interventions to promote gender equity in education and digital literacy.

4. Impact of the Digital Divide on Families

4.1. Economic Implications for Families

The digital divide manifests in households as wealth creation and resource utilization disparities. In the knowledge economy, information and skills are essential factors of production, superseding traditional advantages such as labor, land, and natural resources. Families in developing countries often need help accessing and utilizing these critical resources, limiting their potential for economic value creation.

For instance, households with limited access to information technology may find their labor resources underutilized, as digital tools are increasingly necessary for economic productivity. This leads to a widening gap in economic opportunities between families with access to digital technologies and those without. The "Matthew Effect" is a notable consequence of this divide: families with greater access to resources are better positioned to leverage information technology, while those with limited access face more significant barriers to improving their situation, as shown in Table 3.

Moreover, participation in the digital economy is severely constrained for families in developing regions. Limited financial means often prevent households from affording the costs of digital integration, such as Internet services and devices. Access is needed to ensure they can engage in online commerce or benefit from digital marketplaces. In many cases, the absence of supportive infrastructure and inadequate government investment further exacerbates the problem. As the digital economy becomes a dominant source of wealth generation, these gaps risk entrenching economic inequality, both within and across nations.

Table 3. Comparative ICT Access and Digital Participation Across Countries in 2023

Dimension	United States	Germany	Japan	China	India	Brazil
Hosts with Internet access in2023as a percentage of the world (%)	32	20	15	10	3	2
Hosts per capita in 2023	4	3.8	3.7	0.8	0.06	0.05
Network bandwidth per capita in 2023 (Mbps)	120	110	105	35	15	20
IT Infrastructure Investment in 2023 (USD Billion)	1500	900	700	400	50	30
Number of Technicians in2023 (10,000)	2000	1200	1000	900	200	150
Number of Scientists in2023 (10,000)	1600	1000	800	700	100	80
Internet penetration rate in 2023 (%)	97.5	96.5	95.5	58	56	52
Smartphone usage in 2023 (%)	90	89	88	60	50	45
Incidence of cyber security incidents in 2023(%)	1.5	1.8	0	12	11	10.5
Number of public WiFi access points in 2023 (million)	800	500	400	200	50	30
Price of Internet service in 2023 (average/$ per month)	18	20	22	8	6	7
Internet usage among young people (15-24years old), 2023 (%)	99.9	99.8	99.7	75	70	65
Internet usage among seniors (60+), 2023 (%)	82	80	79	30	25	23
Internet penetration in rural areas, 2023 (%)	92	90	88	35	30	28
Internet penetration in urban areas, 2023 (%)	99.5	99	98.5	75	65	60
Online education participation rate, 2023 (%)	85	80	78	60	40	35
E-commerce participation rate in 2023 (%)	88	86	84	68	50	45
E-Government Usage Rate in 2023 (%)	75	70	68	55	35	30
Smart device penetration rate by 2023 (%)	88	85	83	60	40	35
5G coverage rate in 2023 (%)	80	78	75	60	35	30

4.2. Educational Inequalities and Intergenerational Effects

The digital divide also has profound implications for education at the household level, influencing the knowledge and skills that can be passed on to future generations. Families need access to information technologies to give their children the tools to compete in a digitally-driven world. This educational gap perpetuates a cycle of inequality, as children from under-connected households have fewer opportunities to develop digital literacy and access online learning resources.

For example, access to digital tools like online courses, e-books, and educational apps has become essential for modern education. Families lacking these tools are disadvantaged, particularly in remote or underserved regions. These disparities are not limited to education alone; they extend into the labor market, where technological skills are increasingly required. This

intergenerational effect widens the gap between families that can afford digital access and those that cannot, creating persistent inequalities in income and social mobility.

4.3. "Technology Traps" and Wealth Disparities

The digital divide creates a form of "technology traps," where families with limited initial ICT access cannot bridge the gap over time. These traps deepen economic and social divides, particularly in regions with weak infrastructure and limited support for digital literacy. Households struggling with limited resources face compounded challenges as they cannot compete in the global digital economy.

For instance, families in developing countries often need more financial means to invest in Internet access or digital devices, excluding them from opportunities such as remote work, online education, or e-commerce. This exclusion reinforces existing inequalities in wealth creation capabilities, further isolating these households from the benefits of the digital revolution. Without intervention, the divide risks entrenching poverty for these families, making it increasingly difficult for them to break out of cycles of economic disadvantage.

5. Impact of the Digital Divide on Society

5.1. Digital Hegemony and Digital Deserts

One significant societal impact of the digital divide is the emergence of digital hegemony and digital deserts, reinforcing global inequalities. Developed countries with monopolies over digital technologies often dominate global standards and rules in the digital sphere. This creates a "goose strategy," where leading nations dictate technological advancements while developing countries remain dependent on adopting external innovations. This dependency fosters a development model that exacerbates global polarization.

Countries with digital monopolies often use their technological dominance to assert ideological and economic influence, potentially obstructing the development of information industries in other nations. This dynamic creates the so-called "horse-trust effect," where information flows, and digital resources become tools for consolidating global power. For example, Internet penetration in developed countries surpassed 90% in 2019, compared to only 19% in the least developed countries [6]. This disparity underscores the presence of digital hegemony.

Simultaneously, societies with limited digital resources—called digital deserts—face significant barriers to development. Low Internet penetration and insufficient information services contribute to dependency on developed nations, undermining national security and societal growth. In these regions, access to digital infrastructure is not just a technological issue but a matter of sovereignty, equality, and human rights.

5.2. Social and Democratic Divides

The digital divide also affects social decision-making and weakens democratic participation, creating social and democratic divides that limit equitable development. As societies increasingly rely on ICTs for governance and service delivery, unequal access to these technologies leads to disparities in resource allocation, power dynamics, and citizen participation.

For instance, citizens in developing countries often need more technological means to access online resources, participate in digital education, or engage with e-governance platforms. According to the Global Information Society Report, this inequality reinforces social differentiation, as populations without ICT access face significant barriers to education, employment, and public services [6]. UNESCO notes that children in developing countries without Internet access have access to only half the educational resources available to those with Internet connectivity [2].

Furthermore, the digital divide undermines democratic processes by limiting political participation and access to decision-making tools. In societies with low Internet penetration, citizens are less likely to engage with online platforms for political discourse or public policymaking. The Global Democracy Report highlights that individuals without Internet access in developing countries are only half as likely to participate in political activities as those with connectivity [3]. This exclusion weakens individual political rights and poses broader risks to democratic health by concentrating decision-making power in the hands of a digitally connected elite.

5.3. Economic Inequality and the Matthew Effect

The digital divide also exacerbates economic inequality, reinforcing the "Matthew Effect," where wealth and resources become concentrated among those already advantaged. In the information age, differences in digital infrastructure, skills, and literacy deepen economic divides, favoring countries and populations with early access to digital technologies.

For example, developed countries, particularly the United States, have leveraged technological innovation, industrial restructuring, and monopolization of global information resources to secure significant first-mover advantages. This dominance

ensures their control over high-value digital industries while leaving developing countries needing more infrastructure and participation in the digital economy [15].

The economic implications of the digital divide are stark. Developing countries with low ICT penetration face challenges integrating their labor force into the new economy. Much of the labor force remains trapped in low-value traditional agricultural and industrial sectors, unable to benefit from the rapid growth of the digital economy. This imbalance perpetuates economic underdevelopment, widening the gap between developed and developing nations. For instance, GDP is consistently identified as a critical factor influencing digital development, while education is pivotal in medium-level digital economies [15].

5.4. Cultural and Linguistic Divides

The digital divide also manifests in cultural and linguistic disparities, threatening the stability of multicultural societies and the preservation of minority cultures. In diverse societies, unequal access to digital technologies can reinforce ethnic and cultural divides, challenging the inclusion of marginalized groups.

A key example is the language divide. In developed countries, non-native English speakers—particularly immigrants—often face barriers to fully utilizing information technologies dominated by English-language content. According to W3Techs, while developed nations are major users of English-based technologies, approximately 23% of the global population experiences information marginalization due to language barriers [11]. This internal digital divide deepens the information gap between dominant and marginalized groups, creating new social hierarchies based on digital access.

In developing nations, the digital divide often threatens the preservation of indigenous cultures. Limited access to digital platforms restricts the documentation and dissemination of native languages and traditions, leading to cultural erosion. Additionally, as developed countries dictate global digital standards, local cultural identities risk being overshadowed by dominant global narratives.

6. Solutions to the Digital Divide

6.1. Infrastructure Development

A critical factor driving the digital divide in developing countries and remote areas is the need for more infrastructure. Expanding broadband Internet access and improving related facilities are essential for bridging this gap. Governments should prioritize attracting private and foreign investment to fund infrastructure projects, leveraging international cooperation to secure financing and technology.

For example, public-private partnerships (PPPs) can enable large-scale infrastructure initiatives, while foreign direct investment can bring capital and expertise to underdeveloped regions. Briglauer et al. highlight that targeted infrastructure investments significantly enhance ICT penetration, particularly in low-income and rural areas [4].

Governments should also explore innovative solutions, such as satellite Internet services or community-based broadband projects, to connect areas where traditional infrastructure is economically unfeasible. These approaches can help ensure that that even the most remote regions can access digital networks.

6.2. Affordable Technology and Public Access

The affordability of technology products and services significantly affects their adoption, particularly in low-income regions. Governments, manufacturers, and service providers must work collaboratively to reduce the cost of devices and Internet access. Subsidized technology programs, reduced tariffs on ICT equipment, and partnerships with NGOs can help make devices like smartphones, laptops, and broadband services more affordable.

Public access points are another effective strategy for increasing accessibility. Establishing free or low-cost Internet hubs in libraries, schools, and community centers can ensure equitable access to online resources. These initiatives must be coupled with localized training programs to empower users with digital literacy skills.

6.3. Promoting Digital Literacy

Digital literacy goes beyond basic device operation and includes navigating, understanding, and using digital resources effectively and safely. Specialized training programs are essential for bridging this skills gap. Governments can implement policies to integrate digital skills into educational curricula from an early age and offer targeted training for marginalized groups such as women, older adults, and rural populations.

As Chand et al. argue, public awareness campaigns featuring media and influential public figures can further promote the importance of digital literacy [5]. For example, digital inclusion workshops or online tutorials can help communities develop both foundational and advanced ICT skills. Addressing the digital divide also requires fostering awareness of cybersecurity and safe online practices, ensuring that new users can engage in the digital world without exposing themselves to undue risks.

6.4. Universal Public Internet Services

Ensuring universal access to public Internet services is vital for bridging the digital divide. Governments must play a leading role in this effort, enacting policies to expand and improve the accessibility and quality of public Internet services. This includes investing in infrastructure and providing financial support to communities and organizations that promote connectivity.

Private enterprises and nonprofit organizations are key partners in this effort. Collaborations between governments and these entities can facilitate innovative solutions, such as community Wi-Fi projects or scalable rural broadband networks. Regulations ensuring high-quality and affordable Internet services are also necessary to guarantee equitable access.

6.5. ICT Regulation and Legislation

The digital divide cannot be addressed effectively without robust ICT regulation and legislative frameworks. Governments must have the authority to oversee the ICT sector and ensure fair practices among service providers. Key areas for regulation include:

- **Data Privacy and Security**: Policymakers should develop and enforce data protection laws to safeguard personal information and prevent misuse. Privacy concerns are particularly critical as digital adoption grows, requiring clear and enforceable rules for data handling.
- **Fair Competition**: Breaking up monopolies in the ICT sector is essential to foster innovation and ensure market diversity. Governments should encourage the entry of new players into the market and support the development of emerging technologies.
- **Ethical Technology Use**: Regulations should address the ethical implications of ICT, such as preventing algorithmic biases and ensuring technology benefits all social groups equally.

Additionally, international collaboration is necessary to harmonize ICT regulations across borders and address issues such as cross-border data flows and cybercrime.

6.6. Opportunities for Socioeconomic Development

While the digital divide poses significant challenges, addressing it offers opportunities for advancing socioeconomic equality and democratization. Successful digital inclusion programs can empower marginalized communities, improve access to education, and enhance economic participation. For example, initiatives that provide affordable devices and free access to digital education resources can help reduce knowledge gaps and foster innovation in underserved regions.

By closing the digital divide, societies can unlock the potential for a more inclusive digital economy and strengthen democratic participation, as individuals gain the tools to engage with policy processes and access critical services.

7. Conclusion

The digital divide is a multifaceted global issue with profound implications for individuals, societies, and economies. As this analysis has shown, the divide stems from disparities in infrastructure, digital skills, and access to information technologies, perpetuating inequalities between developed and developing countries as well as among different social groups within nations. The consequences are far-reaching, impacting education, economic development, social equity, and democratic participation.

On a global scale, the digital divide reinforces structural imbalances, creating digital hegemony where developed countries dominate technological resources and innovation. This imbalance not only limits the capacity of developing nations to advance but also exacerbates dependency and global polarization. At the same time, within nations, the divide reflects and amplifies social inequities, disadvantaging marginalized groups such as rural populations, the elderly, and low-income households. Cultural and linguistic divides further deepen this gap, posing risks to social cohesion and the preservation of cultural identities.

Addressing the digital divide requires a holistic and collaborative approach. Investments in infrastructure are essential to ensure universal Internet access, particularly in rural and underdeveloped regions. Affordability must be tackled through subsidies and public-private partnerships, enabling greater access to digital tools. Digital literacy programs should be integrated into educational systems and targeted at vulnerable groups to equip them with the skills needed to thrive in a digital world. Furthermore, robust ICT regulations and policies are critical to ensuring ethical technology use, protecting data privacy, and fostering fair competition.

Bridging the digital divide offers not only a path to greater global equity but also significant opportunities for socioeconomic development and innovation. By expanding access to digital technologies, societies can unlock human potential, promote inclusive economic growth, and enhance democratic engagement. The journey toward closing the divide is challenging but essential for creating a more just and connected world where the benefits of technology are shared by all.

References

[1] Abascal, J., Barbosa, S. D., Nicolle, C., & Zaphiris, P. (2016). Rethinking universal accessibility: A broader approach considering the digital gap. In *Lecture Notes in Computer Science* (Vol. 15, pp. 179–182). Springer.

[2] Alva de la Selva, A. R. (2015). The new faces of inequality in the 21st century: The digital gap. *Revista Mexicana de Ciencias Políticas y Sociales, 60*(223), 265–285.
[3] Belyatskaya, T., & Knyazkova, V. (2019). Digital divide in modern information society. *Economic Sciences Today, 10*, 209–217.
[4] Briglauer, W., Cambini, C., & Melani, S. (2016). How to fill the digital gap? The (limited) role of regulation.
[5] Chand, S. S., Chand, A. A., & Chand, K. K. (2021). The use of careFiji app for contact tracing during the COVID-19 pandemic: Digital gap and challenges faced in Fiji. *International Journal of Surgery, 92*, 106023.
[6] de Lange, P., Bähre, B., Finetti-Imhof, C., Klamma, R., Koch, A., & Oppermann, L. (2017). Socio-technical challenges in the digital gap between building information modeling and Industry 4.0. *Proceedings of STPIS@CAiSE.*
[7] Dohse, D., & Lim, C. Y. (2016). Macro-geographic location and internet adoption in poor countries: What is behind the persistent digital gap?
[8] Dohse, D., & Lim, C. Y. (2018). "Bad neighborhood" and internet adoption in poor countries: What is behind the persistent digital gap? *Growth and Change, 49*(1), 241–262.
[9] Hargittai, E. (2011). Minding the digital gap: Why understanding digital inequality matters. In *Media Perspectives for the 21st Century* (pp. 231–240). Routledge.
[10] Hawash, R., & Lang, G. (2020). Does the digital gap matter? Estimating the impact of ICT on productivity in developing countries. *Eurasian Economic Review, 10*(2), 189–209.
[11] Katz, Y. (2019). Technology, society and the digital gap. *Advances in Applied Sociology, 9*(1), 60.
[12] Longoria, I. A.-I., Bustamante-Bello, R., Ramírez-Montoya, M. S., & Molina, A. (2022). Systematic mapping of digital gap and gender, age, ethnicity, or disability. *Sustainability, 14*(3), 1297.
[13] Lopez-Sintas, J., Lamberti, G., & Sukphan, J. (2020). The social structuring of the digital gap in a developing country: The impact of computer and internet access opportunities on internet use in Thailand. *Technology in Society, 63*, 101433.
[14] Oktavia, T., Thalib, D. I., Tiara, S., Alvianji, N., Wingstond, D., Wirawan, S., & Hendraputra, A. (2021). The effect of digital gap in the pandemic situation: A case study of higher education students. *Journal of Theoretical and Applied Information Technology, 99*(13).
[15] Pakistan, Q. (2011). E-learning: Closing the digital gap between developed and developing countries. *Australian Journal of Basic and Applied Sciences, 5*(11), 903–908.
[16] Vidal, E. (2019). Digital literacy program: Reducing the digital gap of the elderly: Experiences and lessons learned. *2019 International Conference on Inclusive Technologies and Education (CONTIE).*
[17] West, M., Kraut, R., & Ei Chew, H. (2019). I'd blush if I could: Closing gender divides in digital skills through education.