Towards Pakistan's sustainable future: Understanding the impacts of first and second levels of digital divide on the country's sustainable development

Sadia Jamil[1],
University of Nottingham Ningbo, China
Gifty Appiah Adjei,
University of Education, Winneba, Ghana

To cite this article: Jamil, S., & Appiah Adjei, G. (2026). Towards Pakistan's sustainable future: Understanding the impacts of first and second levels of digital divide on the country's sustainable development. *World of Media. Journal of Russian Media and Journalism Studies*, 3, pp. 42–61. DOI: 10.30547/worldofmedia.3.2026.3

Abstract

Although equitable digitalization has been stressed ever since the United Nation's Sustainable Development Goals have been launched, the COVID-19 pandemic has highlighted the digital divide as a key issue affecting the achievement of UN's SDGs in many countries. Particularly, the situation in the developing countries, is apprehensive because a lack of ICTs continues to effect education, social and commercial activities, and people's routine life even in the post-pandemic world. This study specifically reflects upon the case of Pakistan, a developing country, which was ranked 91 out of 100 in the Inclusive Internet Index of 2025. Pakistan's digital divide is increasing that can affect the country's capacity to achieve the UN's sustainable development goals. Therefore, informed by the theory of digital divide, this study aims to explore the impacts of the first and second levels of digital divide on the achievement of sustainable development goals in Pakistan. This study employs a deductive inductive thematic analysis to analyze the interview data. Findings suggests that Pakistan's first and second levels of digital divide affect key areas related to SDGs including: industrial innovation (i.e., SDG 9) and sectoral development (i.e., SDGs 6, 7, 11, 12, 13, 14 and 15); technological and social equity in terms of equal access to technology, education, employment, health, and well-being services (i.e., SDGs 1, 3, 4, 5, 8); education regardless of gender disparity (i.e., SDGs 4 and 5); equal employment opportunities (i.e., SDGs 5 and 8); public's engagement through ensuring their well-being, peace, and justice (i.e., SDG 16).

[1] **Corresponding author:**
Sadia Jamil, University of Nottingham Ningbo, China.
E-mail: Sadia.jamil@ymail.com

Keywords
Digitalization, Sustainable Development Goals, digital poverty, Pakistan's digital ecology.

Introduction
Digital technologies are transforming and interrupting industries, economies, and societies. The concept of sustainable development becomes more relevant with technological advancements. As enablers, digital technologies such as the Internet, artificial intelligence, big data, and cloud computing can assist in bridging the gaps between developed and developing countries, tackle global challenges such as poverty, hunger, and climate change, to name a few, and accelerate human well-being (Sharma, 2019). Amid technological developments, the United Nations' Sustainable Development Goals (SDGs) were launched in 2015. The UN's SDGs reflect an aspiring global initiative that classifies diverse development-related issues into 17 goals, clearly explaining each goal with specific targets. The primary motivation to devise these goals is to improve people's lives in a unified manner, ensuring that no one is left behind within the national boundaries and at the regional levels (ibid). While the UN's Global Agenda 2030 envisaging these SDGs have been welcomed as a shared commitment by the national governments and development agencies, advancements in digital technologies have posed a significant challenge to the achievement of sustainable development goals in many parts of the world (Hoque, 2020). Now it is being recognized that digitalization is indispensable to building sustainable societies. "Closing the global digital divide could play a central role in allowing the UN Sustainable Development Goals (SDGs) to be realized" (Microsoft, 2024, para. 4). However, the widening digital divide in developing countries is alarming and indicates a deadlock in attaining the SDGs (Microsoft, 2024).

There are shocking disparities between those who have and those who have no access to the Internet and digital technologies (such as smartphones, laptops, and computers), especially in the developing countries of the Global South. For example, the situation in South Asia is apprehensive because the region reflects a gender imbalance regarding Internet and mobile phone usage. India and Pakistan are two major economies in South Asia. While India indicates a faster-paced digitalization, with 50 per cent of its population accessing the Internet, Pakistan still falls in the last quartile of the Inclusive Internet Index (2025), ranking 91 out of 100 (UNESCO, 2025).

When looking specifically at the case of Pakistan, the country's government has put rigorous efforts into digitalization and the diffusion of information and communication technologies (ICT) in the past fifteen years. In this regard, some

notable initiatives taken by Pakistan's government include the Next Generation Mobile Spectrum Auctions (NGMSA) in 2013 and 2014 for high-speed 3G/4G connectivity across Pakistan; Telecom Policy (2015) and Digital Pakistan Policy (2018) to provide high-speed 3G/4G broadband connectivity to the Pakistani citizens (Jamil, 2021; Digital Policy, 2020; Ministry of Information Technology & Telecom, 2017; Stryjak, & James, 2016). In addition, "Pakistan 2025 One Nation – One Vision", has been drafted by the country's Planning Commission of Ministry of Planning, Development and Reform (2014), which highlights the key priority areas of country's development including: "people first, inclusive growth, governance, security (water, energy, food), entrepreneurship, knowledge economy, and regional connectivity" (Planning Commission of Ministry of Planning, Development and Reform, 2014: 8–10). Pakistan's vision 2025 policy document accentuates digital technologies as the main enabler for the national government to achieve sustainable development. While the policy document highlights the necessity and urgency of digitalization in sectors including education, health, business and commerce, agriculture, energy and other public service areas (Stryjak, & James, 2016), Pakistan's digital divide continues to manifest itself in terms of a lack of access to ICTs, and the people's abilities to use and take benefit of digital technologies across the country. This indicates the need for fostering digital connectivity to advance the achievement of SDGs, continuing education, social and commercial activities, and enabling Pakistani citizens to participate in society, democracy, and the economy during the crises. This invokes an investigation of how these forms of digital inequalities impact the achievement of the United Nations' Sustainable Development Goals.

Research into digitalization and the digital divide is a growing area of research in Pakistan, given many local scholars have studied the digital divide in the country from various perspectives, such as journalism practice and the digital divide (Jamil, 2022); digital inclusion (Jamil, 2021); digital divide, democracy and social inequalities (Jamil, 2020); digital divide and the operation of National Database and Registration Authority in Pakistan (Hassan et al., 2019); digital divide and e-learning (Jamil, & Muschert, 2023); digital divide and caste in Pakistan (Abdullah, 2015); first-level of digital divide among the Pakistani teaching faculty (Soomro, 2015); Pakistan's digital divide and mobile telecommunication services (Mir, & Dangerfield, 2013); digitalization developments in Pakistan (Ahsan, 2009); gender digital divide (Siegmann, 2009); and digital opportunities in Pakistan (Mujahid, 2002).

Moreover, several local studies address sustainable development in Pakistan, to mention a few: news editorial judgment and sustainable development (Kamboh,

Ittefaq, & Jamil, 2025); renewable energy barriers for sustainable development in Pakistan (Solangi, Longsheng, & Shah, 2021); Pakistan's climate change policy and sustainable development (Ahmed et al., 2020); the role of education in Pakistan's sustainable development (Awan, & Hussain, 2020); the concept of sustainable development in Pakistan (Khan, Awan, & Khan, 2013); poverty, environmental degradation and sustainable development (Alam, 2010); sustainable development, energy consumption and environmental degradation (Alam, Fatima, & Butt, 2007); environmental impact assessment for sustainable development (Saeed et al., 2012).

While it is widely recognized that digitalization is central to the achievement of the UN's SDGs (Mondejar et al., 2021), research into this area is not well-developed in Pakistan. Yet no qualitative study has been carried out that explores how digital divide (in terms of access, usage and skills) impact on sustainable development in Pakistan. Informed by the framework of the theory of the digital divide, this study seeks to explore how digital inequalities are affecting the achievement of the SDGs in Pakistan.

Literature review

Conceptual framework of digital divide

The concept of the digital divide "emerged in the 1990s to define inequalities in access to the Information Communication Technologies (ICTs), framing it as a matter of having or not having access to ICTs" (Compaine, as cited in Ragnedda, 2019: 27). Thus, it originally bordered on "how some specific socio-demographic variables, such as employment status, income, education level, geographic location, ethnicity, age, gender and family structure, influenced the access to the ICTs, creating a digital gap or divide among citizens (domestic digital divide) or countries (global digital divide)" (ibid). Thus, it was originally considered as the binary distinction between haves and have-nots from the tangent of technological adoption (Scheerder et al., 2017) but it was later realized that this consideration reduced the concept "to a simple technological and economic issue, underestimating the social consequences associated with the rise of the digital divide" (Compaine as cited by Ragnedda, 2019: 29). Hence, the evolution of research and policy over the years has established additional divides that keep changing (van Dijk, 2020).

Digital divide is now seen a multidisciplinary concept closely affiliated with the political, economic and cultural development of a society (Vartanova et al., 2021). It considers Internet expansion, penetration and use of technology between individuals, groups or countries (Qureshi, 2012; Vartanova, & Gladkova, 2019). Thus, inequality exists between individuals, households, companies and geographical areas at different socio-economic levels concerning their

opportunities for access to information and communication technologies and the use of the Internet for a wide variety of activities. The differences in ICT access and use have resulted in digital inclusion (the haves / digitally developed) and digital exclusion (the have-nots / digitally under-developed) with accompanying implications for the human, social and economic developments between and within countries. As a result, various dimensions of the phenomenon have been reconsidered. In literature, van Deursen and van Dijk (2019) have advanced three levels of the digital divide, namely:

- The first level of digital divide: physical access to technology;
- The second level of digital divide: digital skills to use technology;
- The third level of digital divide: benefits that can be gained through access to ICTs.

Besides focusing on access to and usage of technology, other forms of the digital divide have also been identified in the literature: age divide, economic divide, educational divide, geographic divide and disability divide (Nguyen, 2020). The age divide looks digital divide through the lens of generations X and Z. Digital natives grew up living in a world of digital technologies and the Internet. Hence, they have a natural ability to adapt ICTs (Ragnedda, & Gladkova, 2020), unlike digitally excluded adults who are vulnerable and struggle to use ICT to access information and other relevant services (Nguyen, 2020). The economic divide considers digital divide from the tangent of affordability. Many individuals do not have access to ICTs and the Internet since they cannot afford them (Borg et al., 2019); hence, they lose out on unprecedented economic growth and development opportunities and vice versa for those who can afford them (Qureshi, 2012). Literature on the education divide submits that individuals with higher education have high digital literacy skills, are active users of ICTs and are aware of the potential opportunities that come with ICT usage (Borg et al., 2019; Chen et al., 2020). The geographical divide cogitates the digital divide across and within locations. In developed than developing countries, many individuals are more likely to have access to and use ICTs to improve the quality of their lives than developing countries vis-à-vis individuals in urban locations in both developed developing countries and rural ones (Nwokedi, 2020). Various physical or cognitive disabilities may socially exclude individuals from the digital society. People with disabilities (PWDs) are digitally disadvantaged. The nature of a disability determines the kind of technology adoption barrier because an intellectual disability may not be a barrier to physical access to ICTs but to the usage of ICTs. In contrast, physical disability may be a barrier to both access and usage of ICT, especially when assistive technologies are unavailable (Borg et al., 2019).

The imperative of bridging digital divide for sustainable development

Digital connectivity remains central to a country's economic and social progress by connecting people, government, and business altogether in real time to achieve sustainable development in diverse sectors (United Nations, 2025). The United Nations 2030 sustainable development agenda lists 17 goals in diverse sectors that necessitates digital connectivity in various forms. *Table 1* explains UN's SDGs:

Table 1

The United Nations Sustainable Development Goals (SDGs)

Number	SDGs	Aim(s)
1	No Poverty	End poverty in all its forms everywhere
2	Zero Hunger	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
3	Good Health and Well-being	Ensure healthy lives and promote well-being for all at all ages
4	Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5	Gender Equality	Achieve gender equality and empower all women and girls
6	Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
7	Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable, and modern energy for all
8	Decent Work and Economic Growth	Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all
9	Industry, Innovation, and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation
10	Reduced Inequality	Reduce inequality within and among countries.
11	Sustainable Cities and Communities	Make cities and human settlements inclusive, safe, resilient, and sustainable
12	Responsible Consumption and Production	Ensure sustainable consumption and production patterns
13	Climate Action	Take urgent action to combat climate change and its impacts
14	Life Below Water	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development
15	Life on Land	Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt biodiversity loss
16	Peace, Justice, and Strong Institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels
17	Partnerships for the Goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Source: United Nations (2026).

Heeks (2022) posit that in a digitally developed context, ICTs enable individuals to develop and use their financial, human, social, physical and informational capital to better their lives. This aligns with insights from research (e.g. Gelb, & Metz, 2018; Masiero, & Bailur, 2021) which avow that ICTs afford opportunities for individuals to be part of digital identity systems and digital engagements that offer the need for authentication and right to access technologically empowered opportunities in the area of universal services like access to digital health and welfare services (SDG 3), educational opportunities (SDG 4) as well as business opportunities in the digital job markets (SDG 8). The foregoing suggests that access and efficient use of ICTs ensure full participation in the digitally mediated society and access to the full spectrum of opportunities that positively enhance the quality of life (Heeks, 2022; Qureshi, 2012; Robinson et al., 2015).

Socially valuable resources and knowledge gained from the Internet or an information-based society are crucial to developing societies and attaining agenda 2030, especially when Mehr (2017) notes that technological innovation has become essential to governments in adopting and implementing policies. Besides, the Internet and ICTs not only give people the voice to participate in political, cultural, economic and social life but also to interact with one another. This makes digital skills and capabilities essential survival skills in contemporary societies because they ensure complete, adequate and equal participation in opportunities that have the potential to improve human lives. This closely intertwines with the attainment of several SDGs and is in sync with Sen's (1999) definition of human development. For these reasons, evidence submits that improvement in the internet and ICTs access, usage and skills influence human development. In a four-year study that used the panel dataset of 38 countries to examine human development through the lens of digital literacy, Nipo et al. (2020: 212) established through regression analysis that not only are high "Internet usage and digital literacy are individually significant in influencing human development, but their interaction effect also yielded statistically significant and positive relationship with human development".

Studies have shown that bridging digital divide is crucial for human and economic developments (Cohen et al., 2018; Yukubi et al., 2022). This is because it promotes the digital economy which integrates with the real economy to offer new job opportunities suitable for the unemployed or the inactive as well. It affords small businesses the power to access new markets, acquires new skills and improve known skills needed to adopt more efficient means of cultivation of crops as well as enable them to offer better goods and services that increase their

competitiveness. Also, it enhances the efficiency in task completion and increase in productivity at work, which leads to higher earnings. As employers benefit from the boost in production, so will governments benefit from an increase in tax revenues (Chakpitak et al., 2018).

It is equally important to note that digital divide heightens digital exclusion and several significant deteriorations in other jurisdictions (Macau, 2021). Hence, regarding the opportunities and benefits ICT offers contemporary societies, the reverse is the case in digitally under-developed societies characterized by an information gap due to low digital literacy and a high digital divide (Chohan, & Hu, 2022). The main reason for the information gap in such societies is digital inaccessibility which may manifest in the absence of material access, skills access, and usage access (Nguyen et al., 2020). Whereas lack of material access is to the first level divide, skills and usage access, have to do with the second and third levels of the digital divide, respectively (van Deursen, & van Dijk, 2018). There is also the issue of motivation access which may bother on the nature of an individual's education, culture, trust, and confidence levels (Nguyen, 2020). These mean that poor access, lack of means and opportunities to have physical access and skills deficit in the use of ICT prevent usage of ICTs and deny access to the benefits that come with digital literacy (Nguyen, 2020). This entrenches digital exclusion, especially in developing countries like Pakistan.

European Commission (2019) identified financial challenges as one of the fundamental factors responsible for digital inaccessibility in some societies. The Commission notes that the affordability challenge prevents many individuals from accessing ICTs and the Internet. This affirms an assertion by Alam and Imran (2015) that deprivation is a central challenge to digital inclusion. Nguyen (2020: 8) explains this situation by noting that "financial barriers to digital technologies can be encountered at any level from individuals, communities to governments". At the individual level, the barrier pertains to the low purchasing power of individuals that prevents them from purchasing digital devices, digital tools and subscriptions needed to satisfy the first level of the digital divide. This leads to the deprivation of educational opportunities that restrain the acquisition and growth of high digital literacy skills. At community and government levels, inadequate support or lack of investments needed to provide necessary digital foundations for digital inclusion and poor coverage of Internet infrastructure may affect all three levels of the digital divide (Nguyen, 2020). The high cost of digital tools and devices and broadband may demotivate individuals from purchasing and using digital devices and widen the digital literacy gap.

Digital exclusion denies the less privileged in the divided access to the information-driven economy and the opportunity to participate in and benefit from the socially valuable resources and knowledge gained from the Internet or an information-based society (Ragnedda, & Gladkova, 2020). This denial has negative implications for individuals' social, human and economic development and the achievement of Agenda 2030. In furtherance, Ragnedda and Mutsvairo (2018) aver that digital exclusion has profound implications in developing societies because the three levels of the digital divide heighten the risk of social exclusion and intensify social inequalities. This necessitates the need for digital inclusion because addressing digital exclusion establishes a fair society and fosters economic growth and social development within and across countries (Nguyen, 2020). While the scholarship indicates the importance addressing all three levels of digital divide to ensure sustainable development, this study focuses on the impacts of first and second levels of digital divide on Pakistan's sustainable development.

Methodology

The main research question is the following one: how do the first and second levels of digital divide impact the achievement of Sustainable Development Goals in Pakistan? To investigate this research question, this study uses the qualitative method of in-depth and semi-structured interviews. Using purposive sampling, the researchers have carried-out 23 interviews of ICT professionals (i.e., 16 male and 7 female) from Pakistan telecom industry. These professionals are full-time employees of Pakistan Telecommunication Limited (PTCL) and local mobile companies including *Jazz-Warid*, *Ufone*, *Telenor* and *Zong*. The purpose of selecting interviewees from these telecom-sector organizations is bi-fold. First, these organizations operate across Pakistan's four provinces for the provision of Internet and other telecommunication services. Second, these are the organizations that have played a key role in supporting the government of Pakistan in building a digital landscape in the past decade. Thus, interviewees' feedback from these organizations have been included to shed light upon Pakistan's divide and its impacts on the country's sustainable development.

All interviews were conducted online using Zoom. As far as the duration of interview is concerned, each interviewee has been interviewed for around 60–75 mins. All interviewees have been interviewed in Urdu language (i.e., mother tongue in Pakistan) and then all interview transcripts have been transcribed in English language and in verbatim. Moreover, this study employs a deductive inductive thematic analysis to analyze the interview data under two key themes

that have emerged deductively from the conceptual framework of digital divide, including:

- Impacts of the first level of digital divide on the achievement of SDGs;
- Impacts of the second level of digital divide on the achievement of SDGS

In deductive thematic analysis, themes emerge from the theory or conceptual framework (see Jamil, 2021; Braun, & Clarke, 2006). Deductive thematic analysis, in this study, was performed in three steps. First, the researchers listed up useful statements of interviewees that are relevant to each research question. Secondly, these listed statements were segmented as per the interviewees' responses to each research question. Segments (i.e., research-related transcribed text) can either be a single word or a paragraph (Boyatzis, 1998). In this study, segments include the interviewees' responses to each research question (including follow-up interview questions.

Lastly, interviewees' responses were coded in a manual coding book by the lead researcher (i.e., the first author) and a second coder. All interview transcripts were read repeatedly to develop familiarity with the data. Meaningful statements and text segments relevant to the research objectives were assigned initial codes. Similar codes were then grouped into categories, which were subsequently reviewed and refined into broader themes through an iterative process. Throughout the analysis, codes and themes were compared across transcripts to ensure consistency and coherence. This manual coding approach facilitated the systematic identification and interpretation of patterns within the qualitative data and followed established qualitative data analysis procedures (Braun, & Clarke, 2006). Moreover, the purpose of using a second coder is to ensure the consistency of coded data, which has been created based on the keywords and short phrases in the interviewees' responses to interview questions. Finally, the findings were presented under two key themes that emerged from the coded data of research questions one and two.

To comply with ethics' protocols, all interviewees have been provided a project information sheet that explains about the objectives of this study, research method, definitions of key terms used in this study, interviewees' voluntary participation, confidentiality of their names and access to research findings. As mentioned in project information sheet, names of all interviewees were removed while quoting the data and replaced with pseudonyms (such as WXZ).

Results and discussion

This study reveals that Pakistan's digital divide is largely underpinned by a lack of adequate digital infrastructure, people's digital incompetence to use the

Internet and ICTs (i.e., digital capabilities), restrained access to commodities (i.e., digital devices), and the country's weak digital governance. This implies that Pakistan lags in all key areas of digitalization that are necessary to ensure the achievement of UN's Sustainable Development Goals. Thus, this study unpacks that the first and second levels of digital divide are affecting some key areas of SDGs in Pakistan including:

- Industrial innovation (i.e., SDG 9) and sectoral development (i.e., SDGs 6, 7, 11, 12, 13, 14 and 15);
- Technological and social equity in terms of equal access to technology, education, employment, health, and well-being services (i.e., SDGs 1, 3, 4, 5, 8);
- Education regardless of gender disparity (i.e., SDGs 4 and 5);
- Employment opportunities regardless of gender disparity (i.e., SDGs 5 and 8);
- Public's engagement through ensuring their well-being, peace, and justice (i.e., SDG 16).

Impacts of the first level of digital divide on the achievement of SDGs

This study unpacks the impacts of the first level of digital divide on Pakistan's industrial innovation (SDG 9) and sectoral development (i.e., SDGs 6, 7, 11, 12, 13, 14 and 15). Interviews data unpacks the apprehension of interviewed ICT professionals regarding the achievement of SDGs without addressing Pakistan's pervasive digital divide. For example, an interviewee states:

Pakistan has progressed in terms of its ICT infrastructure. Nevertheless, the country lacks a widespread digital infrastructure and proper digital governance that are necessary to achieve sustainable development. We cannot build smart cities until we really have a robust digital infrastructure and digital-savvy public that is skilled enough to drive their lives using latest digital technologies. Industrial and sectoral innovation is slow in Pakistan because the country's rural and remote areas lack proper digital infrastructure and people still find it difficult to access digital commodities. We mostly talk about economic poverty, but digital poverty is manifesting itself even among those who can afford or access the Internet. There is a wide range of Pakistani population that can access and afford the Internet and digital devices, but still many are deprived of reliable internet access due to different reasons. I think the most affected areas of SDGs by Pakistan's first level of digital divide are industrial innovation, social equity, education, employment, human well-being, and public's engagement (Interviewee ADH).

When talking about how Pakistan's first level of digital divide impacts on industrial and sectoral innovations, a senior representative of Pakistan Telecommunication Limited, mentions:

What is apprehensive for me is the poor digitalization in manufacturing, education and health sectors that have resulted in millions of Pakistanis being affected right now. Computer control and machine-to-machine communication through cyber-physical systems can help in optimizing manufacturing outcomes, resulting in better economic growth. Besides, access to the Internet and digital devices (like laptops and smart phones) are so crucial in times when students must rely on remote education and people need health services while respecting social distancing measures. Telemedicine has been essential to bring solutions to consumers regardless of their location and income. Digital tools play a vital role in promoting people's well-being and improving their quality of life through facilitating access to health care. The problem is even if people have access to the Internet and digital devices, they lack knowledge to use it effectively for varied purposes (Interviewee LMN).

This study further reveals that Pakistan's digital governance is still not too strong enough to ensure effective policies that can facilitate the building of digital infrastructure, ensuring to meet the requirements of diverse sustainable development goals. Almost all interviewed professionals, from the local mobile companies, suggest that Pakistan's Telcom sector needs the government's support to incorporate their role towards sustainable development initiatives. According to a *Jazz-Warid* staff member:

I agree that Pakistan has progressed in terms of ICT infrastructure considering its current economic condition. People have now access to digital facilities, such as NADRA. However, there is no regulatory mechanism that review the quality of digital infrastructure, people's digital competencies, access and usage of commodities and the government's digital reforms in different sectors. Consequently, we do not see technological and social equity, affecting equal provision of education and employment opportunities. Also, we need the government's support to ensure the Internet freedom that is essential for improving people's digital connectivity in Pakistan (Interviewee SDK).

Internet freedom remains a topic of debate in Pakistan when it comes to ensuring people's digital connectivity. It is crucial to regulate ICT sector in a way that does not affect people's essential need of digital connectivity and their online activities, which is important to avoid status quo in achievement of sustainable development goals in diverse sectors.

Moreover, this study highlights an increase in smartphone penetration coupled with improving 3G and 4G access across Pakistan. This can be considered as the key enablers to allow the country to digitalize at least in terms of improved digital infrastructure that can help to progress towards the achievement of UN's SDGs. For example, Pakistan's telecom companies, like *Jazz-Warid* and *Telenor*, are undertaking initiatives by bringing innovative products and digital solutions to masses such as offering digital learning solutions, digital agricultural mobile apps, mobile financial services, and digital birth registration services (Telenor, 2021; Digital Pakistan, 2018). These initiatives deliver some tangible positive outcomes. However, all these initiatives are fragmented in nature because of factors affecting the public's digital access to the internet. According to an interviewee:

Digital access is affected first at the micro level. A lot of people, even in urban areas, do not have access to reliable Internet connection. The cost of Internet services is very high for low income or middle-income segments of the society. Electricity failure or constant load shedding adds another layer of difficulty not only for individuals, but also for industries' operation. Women then face cultural barriers as many families still have different normative standards for accessing and using Internet and ICT devices. Nevertheless, Pakistan has progressed a lot socially in recent years, resulting in a more socially inclusive environment (Interviewee TYM)

Considering the highlighted challenges by the interviewees, a need for a holistic approach towards a digital vision and governance, and an overall policy and execution framework for digitalization in Pakistan that covers material access, skills access and usage access all together at micro (i.e., individual level) and macro (i.e., institutional, industrial and sectoral levels) should be emphasized. There is a pressing need for bringing together all stakeholders under one roof for the common agenda of improving the life of masses and attain SDGs in Pakistan. Mitigating the first level of digital divide and improving access to technologies can positively impact the achievement of SDGs. In Asia, like Europe, digitalization is viewed as a key enabler to achieve sustainability in different sectors. This is evident with the growth of digital finance, e-commerce, and e-governance in Pakistan's neighboring countries, such as China and Bangladesh. In both countries, the key drivers of digitalization (i.e., infrastructure, capabilities, commodities, and governance) empower local populations, despite a growing divide between urban and rural access to technologies in these countries. To help Pakistan achieve SDGs, it is the responsibility of all individuals of the society, all institutions, and all political parties to participate in the process of policy formulation and execution. Every sector of the society, public or private, has a role to play and every role is significant to the agenda of achieving SDGs.

Impacts of the second level of digital divide on the achievement of SDGs

When analyzing the digitally incompetent segments of Pakistan, this study suggests that digital divide is not mere the issue of accessing an adequate digital infrastructure. Rather a large segment of the country's population lacks digital skills, which is affecting different sectoral growth. For instance, an interviewee highlights, *"we are not able to revolutionize our manufacturing process across different industries as we do not have enough digitally competent workers who are aware with the concept of smart manufacturing that integrates the use of computer and the Internet to optimize industrial yield".* Similarly, an interviewee from *Telenor* asserts:

Digitalization is central to sustainable development; however unfortunately, we are a digitally poor nation and continue to struggle hard in the development process. A considerable population of Pakistan may claim that it has access to the Internet and digital devices (such as smart phones, computers, and laptops), but their usage is limited due to a lack of digital skills to meaningfully use these technologies in education, employment and using e-services. Our people lack digital skills to use the Internet and digital technologies (Interviewee DCL).

Digital divide, in terms of a lack of people's digital competencies to use digital tools (such as hardwares and softwares), affects the achievement of SDGs in many ways, for instance: reduced employment opportunities (i.e., SDG 8), less industry innovation (i.e., SDG 9), limitation to use technological solutions to address issues related to energy, water and sanitation, and environmental degradation. Energy and water management strategies based on digitalization tools can contribute to managing with high accuracy supply and demand for a more efficient and sustainable generation and use of energy. For example, an interviewee suggests, *"Pakistan is an agricultural country. The use of mobile application software gives unique opportunities for connectivity with agricultural stakeholders and cultivators while ensuring better ways of agricultural productivity and economic gains that hence helps to reduce poverty" (Interviewee RSF).*

Factors such as gender, age, education level, attitudes towards the adoption of technology, all together affect the Pakistani people's digital skills and competencies to use ICTs and the Internet – even if they can access the Internet and afford digital commodities. For example, another interviewee highlights:

People of diverse age groups, gender and educational levels, lack digital skills to use the Internet, and digital gadgets and that can affect the country's progress towards sustainable development. This is the situation in urban areas. In rural areas, people may use some basic features of smart phones, but you cannot literally consider them as digitally skilled to use the Internet and ICT devices at work (Interviewee JKM).

Likewise, another interviewee from *Jazz-Warid*, says:

Artificial Intelligence is emerging as the backbone of technology-related solutions. People's digital competencies and their awareness related to AI-enabled devices and software is very important because we are heading towards the era of AI technology that shall affect the achievement of sustainable development across all sectors. (Interviewee WMO).

This study clearly manifests that Pakistan lacks the key drivers of digitization that are necessary for the attainment of UN's Sustainable Development Goals. Despite Pakistan's commitment to adopt these goals, the country has fallen behind on delivering the key targets for different goals. Strong digital infrastructure, to connect people online and offline, is very crucial for better operationalization of society and the public's life. Digital infrastructure is the need of every society today to achieve the holistic goal of reducing societal disparities and poverty, aligning with the need to provide digital education to the final users (Vartanova, & Gladkova, 2019). Nevertheless, a large proportion of the Pakistani population, especially those living in remote and rural areas, experience double restriction of access and skills to use the Internet and digital technologies (Raza et al., 2026). It directly impacts the key areas of SDGs including technological and social equity, education, employment, and public's engagement.

In recent years, an increase in smartphone penetration coupled with improving 3G and 4G access can be considered as the key enablers to allow the country to digitalize at least in terms of improved digital infrastructure that can help to progress towards the achievement of UN's SDGs. Pakistan's telecom companies, like *Jazz-Warid* and *Telenor*, are undertaking initiatives by bringing innovative products and digital solutions to masses such as offering digital learning solutions, digital agricultural mobile apps, mobile financial services, and digital birth registration services (Telenor, 2021; Digital Pakistan, 2018). However, all these initiatives are fragmented in nature because Telcom companies do not consider the Pakistani people's digital capabilities strong enough, suggesting these initiatives may not ensure sustainability in the long run. It is crucial to consider diverse segments of digitally incompetent people to addressing the UN's 17 SDGs at sectoral and industry levels.

Conclusion

The advancements in information and communication technologies have considerably altered the way we live, work, learn and communicate. These ICT-led transformations have facilitated the distribution of information and the delivery of services at an unprecedented speed and scale, enhanced

productivity across diverse sectors, and prompted innovations that address important development challenges. While advancements in ICTs have brought many positive outcomes, they are also creating new layers of inequalities. The United Nation's Sustainable Development Agenda (2030) emphasizes equitable digitalization. However, the COVID-19 pandemic has highlighted that digital divide is undermining the achievement of the UN's SDGs. This study reflects upon the situation of Pakistan and reveals that the country is not just going through economic crises, but also it confronts the challenge of digital divide when applying the Western concept of sustainable development. The country has its specific socio-cultural, political, and economic challenges that do affect its capacity to use technology as a potential solution for sustainable development.

Drawing on the framework of digital divide, this study reveals that Pakistan's first and second levels of digital divide affect key areas related to SDGs including: industrial innovation (i.e., SDG 9) and sectoral development (i.e., SDGs 6, 7, 11, 12, 13, 14 and 15); technological and social equity in terms of equal access to technology, education, employment, health, and well-being services (i.e., SDGs 1, 3, 4, 5, 8); education regardless of gender disparity (i.e., SDGs 4 and 5); equal employment opportunities (i.e., SDGs 5 and 8); public's engagement through ensuring their well-being, peace, and justice (i.e., SDG 16). This study further reveals that the country's digital governance is weak enough to ensure effective policies that can facilitate the development of digital infrastructure and capabilities, ensuring to meet the requirements of diverse sustainable development goals.

These findings are not unique to Pakistan, which is a developing country. Many first world countries, like UK, struggle to combat digital divide for sustainable economic growth and development. Nevertheless, governments in the developed or First World countries, do pay attention to introducing policies and reforms that can help to mitigate digital inequalities for equitable and sustainable development. The UN's 2030 Agenda for Sustainable Development (2030 Agenda) also strongly positions ICTs as an enabler to achieving the Sustainable Development Goals. However, in the case of Pakistan, digitalization and ICT innovations can create both opportunities and disruptions, and their outcomes will depend on how effectively the Pakistani government introduce uniform policies and reforms across all four provinces of the country, how the central government ensure provincial and political consensus on digitalization initiative for the achievement of SDGs, and how the government creates synergy of the public and private-sector companies and stakeholders to address the issue of digital poverty for sustainable development.

Moreover, to ensure that no one is left behind, it is necessary to identify and understand the characteristics of the Pakistani population groups that are left behind in their access to and use of ICTs. This can inform inclusive policies and priorities that enable disadvantaged groups to fully gain benefits of ICTs for socioeconomic progress. Finally, offering digital capabilities, technology, infrastructure, and governance will not ensure an equitable distribution of these drivers for the achievement of SDGs in Pakistan. Further research is needed to evaluate the equitable provision of digital infrastructure, capabilities, commodities and governance across sectors, different segments of Pakistani society, as well as across the country's four provinces. This shall help to better understand how the key drivers of digitalization can help in the uniform achievement of sustainable development goals across Pakistan.

References

Abdullah, A. (2015). Digital divide and caste in rural Pakistan. *The Information Society*, 31(4), pp. 346–356. DOI: 10.1080/01972243.2015.1040936

Boyatzis, R. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development.* Thousand Oaks, CA: Sage.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research,* 3(2), pp. 77–101.

Borg, K., Boulet, M., Smith, L., & Bragge, P. (2019). Digital inclusion & health communication: A rapid review of literature. *Health Communication*, *34*(11), pp. 1320–1328. DOI: 10.1080/10410236.2018.1485077

Chakpitak, N., Maneejuk, P., Chanaim, S., & Sriboonchitta, S. (2018). Thailand in the era of digital economy: How does digital technology promote economic growth? *Studies in Computational Intelligence,* 753, pp. 350–362. DOI: 10.1007/978-3-319-70942-0_25

Chohan, S. R., & Hu, G. (2022). Strengthening digital inclusion through e-government: Cohesive ICT training programs to intensify digital competency. *Information Technology for Development,* 28(1), pp. 16–38. DOI: 10.1080/02681102.2020.1841713

Cohen, J., Bancilhon, J. M., & Grace, T. (2018). Digitally connected living and quality of life: An analysis of the Gauteng City-Region, South Africa. *Electronic Journal of Information Systems in Developing Countries,* 84(1), pp. 1–12. DOI: 10.1002/isd2.12010

Digital Policy (2020). *The Digital Pakistan policy: Vision and Execution.* URL: https://digitalpakistan.pk/blog/the-digital-pakistan-policy-vision-and-execution/

European Commission (2019). *Digital Inclusion for a Better EU Society.* URL: https://ec.europa.eu/digital-singlemarket/en/digital-inclusion-better-eu-society

Heeks, R. (2022). Digital inequality beyond the digital divide: Conceptualizing adverse digital incorporation in the Global South. *Information Technology for Development*, 28(4), pp. 688–704. DOI: 10.1080/02681102.2022.2068492

Jamil, S. (2019). Mobile phone usage and its socio-economic impacts in Pakistan. In Xiaoge Xu (Ed.). *Impacts of Mobile Use and Experience on Contemporary Society.* IGI Global, pp. 112–127.

Jamil, S., (2021). From digital divide to digital inclusion: Challenges for wide-ranging digitalization in Pakistan, *Telecommunications Policy,* 45(8). DOI: 10.1016/j.telpol.2021.102206

Jamil, S. (2022). Evolving newsrooms and second level of digital divide: Implications for journalistic practice in Pakistan. *Journalism Practice*, 17(9), pp. 1864–1881.

Jamil, S., & Muschert, G. (2023). COVID-19 pandemic and e-learning: Digital divide and educational crises in Pakistan's universities. *American Behavioral Scientist*, 68(9), pp. 1161–1179.

Jamil, S., & Appiah-Adjei, G. (2025). The dire need of ecological sustainability in Pakistan: The agenda setting role of news media to address environmental problems. *Media Asia*, 52(3), pp. 367–387. DOI: 10.1080/01296612.2024.2396214

Kamboh, S. A., Ittefaq, M., & Jamil, S. (2025). Powerful news sources versus advocate-journalists as factors affecting the editorial agenda-building on Sustainable Development Goals. *Journalism Practice,* 19(12), pp. 2789–2810. DOI: 10.1080/17512786.2024.2369917

Macau, W. (2021). *The Impact of COVID-19 on the Growing North-South Divide.* URL: https://www.e-ir.info/2021/03/15/the-impact-of-covid-19-on-the-growing-north-southdivide/.

Ministry of Information Technology and Telecom (2015). *Telecommunication Policy.* URL: https://moitt.gov.pk/Policies

Ministry of Information Technology and Telecom (2017). *Digital Pakistan Policy.* URL: http://digitalrightsmonitor.pk/wp-content/uploads/2017/10/Digital-Pakistan-Policy-2017.pdf

Masiero, S., & Bailur, S. (2021) Digital identity for development: The quest for justice and a research agenda. *Information Technology for Development,* 27(1), pp. 1–12. DOI: 10.1080/02681102.2021.1859669

Mehr, H. (2017). *Artificial Intelligence for Citizen Services and Government.* URL: https://ash.harvard.edu/wp-content/uploads/2024/02/artificial_intelligence_for_citizen_services.pdf

Microsoft (2024). Strengthening Multilateral Partnerships and Harnessing Technology in Support of the SDGs. URL: https://blogs.microsoft.com/on-the-issues/2024/09/20/microsoft-at-the-79th-session-of-united-nations-general-assembly/

Nguyen, A. (2020). Digital inclusion: Social inclusion in the digital age. In Liamputtong, P. (Ed.). *Handbook of Social Inclusion.* Springer. DOI: 10.1007/978-3-030-89594-5_14

Nipo, D. T., Lily, J., Idris, S., Pinjaman, S., & Bujang, I. (2020). Human development through the lens of digital literacy. *Business and Economic Research*, 10(3), pp. 203–215.

Nwokedi, V. (2020). Digital inclusion and sustainable development goals: The role of the Libraries. *International Journal of Educational Research and Development,* 7(1), pp. 1–6.

Planning Commission of Ministry of Planning, Development and Reform (2014). *Pakistan 2025. One nation – One Vision.* URL: https://www.pc.gov.pk/uploads/vision2025/Vision-2025-Executive-Summary.pdf

Qu, J., Simes, R., & O'Mahony, J. (2017). How do digital technologies drive economic growth? *Economic Record*, *93,* pp. 57–69. DOI: 10.1111/1475-4932.12340

Qureshi, S. (2012). As the global digital divide narrows, who is being left behind? *Information Technology for Development,* 18(4), pp. 277–280, DOI: 10.1080/02681102.2012.730656

Ragnedda, M., & Mutsvairo, B. (2018). *Digital Inclusion: An International Comparative Analysis*. Lexington Books.

Ragnedda, M. (2019). Reconceptualizing the digital divide. In Mutsvairo, B., & Ragnedda, M. (Eds). *Mapping the Digital Divide in Africa. A Mediated Analysis.* Amsterdam University Press, pp. 27–43.

Ragnedda, M., & Gladkova, A. (2020). *Digital Inequalities in the Global South.* Palgrave Macmillan.

Raza, S. H., Ogadimma, E. C., Abdullah, Z., Khan, S., Jalarajan, R. S., Jamil, S., Malik, A., Alkhowaiter, M., & Khan, S. U. (2026). Can data visualization storytelling in energy communication campaigns ingrain farmers' intentions to use agrivoltaic system? Evidence from Global South. *International Journal of Energy Sector Management*, 20(1), pp. 217–239. DOI: 10.1108/IJESM-07-2024-0020

Robinson, L., Cotten, S. R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., Schulz, J., Hale, T. M., & Stern, M. J. (2015). Digital inequalities and why they matter. *Information Communication and Society,* 18(5), pp. 569–582. DOI: 10.1080/1369118X.2015.1012532

Sharma, S. (2019). *Achieving SDGs Through Digital Transformation in Digital Economy & Building Digital Skills.* URL: https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/SiteAssets/Pages/Events/2019/jul-iran-dtx/Workshop-on-%E2%80%9CDigital-Transformation-in-Digital-Economy%E2%80%9D/ITU%20Keynote%20Presentation%20Session%202%202019%20R3.pdf

Scheerder, A., van Deursen, A. J., van Dijk, J. A. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second-and third-level digital divide. *Telematics and Informatics*, 34, pp. 1607–1624. DOI: 10.1016/j.tele.2017.07.007

Sen, A. (1999). *Development as Freedom.* Oxford University Press.

Stryjak, J., & James, H. (2016). *Country Overview: Pakistan – A Digital Future.* URL: https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/12/Country-Overview_Pakistan_Digital-Future.pdf.

UNESCO (2025). *Inclusive Internet Index.* URL: https://www.unesco.org/en/world-media-trends/inclusive-internet-index

United Nations (2016). *Identifying Social Inclusion and Exclusion*. URL: https://www.un.org/esa/socdev/rwss/2016/chapter1.pdf

United Nations (2025). *Global Sustainable Development Report.* URL: https://unstats.un.org/sdgs/report/2025/

United Nations (2026). *Transforming Our World: The 2030 Agenda for Sustainable Development.* URL: https://sdgs.un.org/2030agenda

Van Deursen, A. J., & Van Dijk, J. A. (2018). The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *New Media & Society,* 21(2), pp. 354–375.

Van Dijk, J. (2020). *Closing the Digital Divide: The Role of Digital Technologies on Social Development, Well-Being of All and the Approach of the Covid-19 Pandemic.* Polity Press.

Vartanova, E., Gladkova, A., Lapin, D., Samorodova, E., & Vikhrova, O. (2021). Theorizing Russian model of the digital divide. *World of Media. Journal of Russian Media and Journalism Studies,* 1. DOI: 10.30547/worldofmedia.1.2021.1

Vartanova, E. & Gladkova, A. (2019). New forms of the digital divide. In J. Trappel (Ed.) *Digital Media Inequalities: Policies Against Divides, Distrust and Discrimination*, pp. 193–213. Nordicom.

Yakubi, Y. A. Y., Basuki, B., Purwono, R., & Usman, I. (2022). The impact of digital technology and business regulations on financial inclusion and socio-economic development in low-income countries. *SAGE Open,* 12(3). DOI: 10.1177/21582440221116112