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Policy Brief

ENHANCING INFRASTRUCTURE PROVISIONS TO ADDRESS THE DIGITAL DIVIDE

Task Force 8

Resilient Infrastructure and Financing

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Abstract

In the era of rapid digital integration, productivity increases significantly for those with digital access (Remes, Mischke and Krishnan, 2018; Diermeier and Goecke, 2017). However, the rate of digital integration is not distributed equally across society (McKinsey Global Institute, 2018). The disparity can be observed in various dimensions, such as between developed and developing countries, urban and rural areas and among different income groups. This socioeconomic inequality has been exacerbated by the COVID-19 pandemic, since groups with better digital access could maintain or even increase levels of productivity compared with those without during the limitation of in-person interaction. Numerous studies have suggested that lower-income groups' productivity is benefitted significantly by digital access. The marginal productivity due to digital access for lower-income groups is higher than that of the higher-income group (Cieslik and Kaniewsk, 2004; Jensen, 2007; Muto and Yamano, 2009; Koutrompis, 2009; Riyanto, et al., 2017). The lack of inclusivity in digital access has also widened inequality during the crisis. Inclusive digitalisation will generate an economic cushion for the poor and vulnerable groups especially during crisis.

Generating more equal digital access and usage requires major improvements in both hard and soft infrastructure. However, achieving adequate levels of infrastructure provisions face several institutional, technical and financial challenges. This policy note identifies policy recommendations to ensure better digitalisation inclusivity through: (1) establishing a well-defined and commonly agreed framework for an inclusive digital economy, designed specifically for developing countries; (2) improvements in institutional capacity; (3) establishing public infrastructure of knowledge; (4) better use of alternative finance instruments and (5) establishing more progressive fiscal instruments. Group of 20 leaders could take the leadership role in assisting and endorsing the creation of an inclusive digital framework for developing countries. The G20 could also encourage more financial and technical assistance provisions from developed to developing countries.

Challenges

Rapid technological progress has touched and reshaped almost all aspects of society's behaviour and interactions. Digitalisation is one of the most recent manifestations of technological progress. Unfortunately, technological progress – including digitalisation – has not been distributed equally; thus, the potential for increased productivity can only be enjoyed by certain groups of people (McKinsey Global Institute, 2018), triggering a rise in inequality. Producers who manage to integrate their selling channels into the digital marketplace, for example, can reach a substantially bigger market. Students with internet access are granted broader learning resources compared with those who have no digital access. Digitalisation can widen income inequality on both the individual and country level. The gains from digitalisation may accrue mostly in the top income brackets.

The COVID-19 pandemic has exacerbated inequalities as it has pushed society to significantly reduce in-person interaction; thus, enforcing a shift of economic activities onto digital platforms (Chernoff and Warman, 2020). Inequality in digital technology exists in many areas, such as infrastructure, government policy and regulation, interoperability, cybersecurity and digital skills (Ingram, 2021). Inequality prevailed between urban and rural areas even prior to the pandemic. The provision of adequate infrastructure, both in quality and quantity, plays a major role in ensuring the inclusiveness of benefits generated by digitalisation, especially in the context of urban-rural disparity. In addition, the digital divide also widens by gender. In developing countries, women are less likely than men to use the internet (Ingram, 2021).

Research also shows that access inequality exists between high- and low-educated individuals, high- and low-income individuals and individuals from majority and minority ethnic groups. Access here relates to physical access, skills and usage. The physical access gap has declined in developed countries in East Asia, Northern Europe and North America, but still prevails in developing countries. A high worldwide digital Gini coefficient shows global inequality in digital technology (Ho and Tseng, 2006). The gap in physical access generates consequential effects like a gap in skills needed for users and usage. Access to digital skills, such as the ability to retrieve information, to communicate and to create content, is more important than the physical access itself. A vast number of empirical studies show the digital divide related to levels of education affect both developed and developing countries (Cohendet, 2003), with the level of education being the most important factor in access (Van Dijk, 2017). Studies in developed countries such as the United States found that individuals with higher education utilise digital technology for income or potential-enhancing objectives such as work and education, while individuals with a lower level of education tend to use digital technology for consumption objectives such as entertainment and messaging. Survey data from Switzerland also indicates an access gap between level of education and income, showing individuals with higher education use the internet for informational and service-oriented purposes while individuals with lower education use the internet for entertainment purpose.

Differences in use based on age and sex were less strong. (Cho, et al., 2003; Bonfadelli, 2002). On the other hand, a study based on Indonesia's national socioeconomic survey data found that households with the lowest income quintile used the internet for productive purposes such as for school work (Riyanto et al., 2017).

The challenge in addressing access inequalities may focus on cutting the following cycle: categorical differences (individuals, demographics, gender, race majority versus minority or occupation—white collar v. blue collar) lead to inequality in distribution of resources; inequality in distribution of resources yields inequality of access to digital technology; inequality of access in digital technology generates inequality in societal participation and inequality in societal participation leads to categorical and resources distribution inequalities. (Van Dijk, 2017). Enhancements in the education sector seems to be a vital factor in cutting these cycles. In addition, studies show that wealth and income equality are also significant factors in increasing digital technology diffusion. Economic development and social equality are crucial for digital connectivity. Fiscal instruments such as tax incentives in the education and productive sectors should be set in a more progressive manner.

Proposals for G20

To overcome digital inequalities, a comprehensive strategy involving various parties including the government and all levels of society (companies, NGOs, communities and individuals) is of utmost importance. Based on West and Health's (2009) technological divide framework, Jamil (2021) found that digital inequalities in a developing country, Pakistan, can be associated with the problems of (1) access, (2) knowledge and awareness, (3) learning opportunities and support and (3) skills. Thus, efforts must be made to improve these aspects. Recent studies have found that the digital divide in both access and usage exists not only in developing countries but also in developed countries. Various strategies have been suggested to overcome digital inequalities in Austria, including providing financial support for low-income households to acquire digital devices and internet connection as well as training to improve their digital skills (Zilian and Zilian, 2020). Beaunoyer et al. (2020) propose a comprehensive framework of multilayered mitigation strategies targeting individual's technology access and use. More specifically, these strategies include increasing physical access, increasing digital literacy and increasing social support access.

To achieve digital inclusion, aspects of “access” and “usage” must be incorporated. While developed countries have generally solved the issue of “access” and are now focusing on the “usage”, developing countries still face both challenges (Anandaram, et. al., 2021). Ensuring the inclusiveness of digitalisation will warrant several policy initiatives. The following is the proposed framework of digital inclusion.

- **Establishing a well-defined and commonly agreed framework on inclusive digital economy and addressing digital infrastructure provisions through overall connectivity infrastructure specifically for developing countries.**

Concepts on how digital inequality works – as well as frameworks on how to reduce it – have been sporadically proposed, such as by West and Health (2009), Van Dijk (2017), Jamil (2021), Beaunoyer et al. (2020) and O'Sullivan et al. (2021). However, the utility of these frameworks towards precise policy prescription is limited by a lack of coherence among them. Synthesising these frameworks while acknowledging the diverse contexts they originate might provide a common language, pathway and benchmark. Consequently, establishing a well-defined and commonly agreed framework of an inclusive digital economy can provide the foundation for progress and cooperation in an inclusive digital economy. Developing countries can benefit from the inclusive economic advancement derived from the declining digital divide, while developed countries can benefit from advancing their economic and strategic interests (Ingram, 2021).

Another issue is the lack of high-level frameworks with low-level technical reports and assessments. Reports on the assessment of infrastructure accessibility are generally limited to certain types of infrastructure. However, digital infrastructure provisions also depend on the maturity of other basic elements. For instance, Shenglin et al. (2017) note two issues inhibiting the full capture of available digital

infrastructure: affordable network services, devices and applications as well as the digital skills to create or add value. Thus, infrastructure provisions (such as digital goods and services and skill distribution) are interrelated with connectivity infrastructure (such as broadband, satellite and wireless networks). This systemic view needs to be emphasised in the framework.

Despite the need for a common framework, it is fundamental that there are distinctions between the different stages of economies, as digitalisation is fundamentally different between developed and developing countries. While developing countries lack both hard and soft infrastructure, hindering availability and affordability (Shenglin et al., 2017), yet at the same time, this means that developing countries face fewer path-dependence issues. One example is Kenya's experience in leapfrogging the lack of banking institutions through mobile money banking, notably through the M-Pesa platform (Piper, 2020). Likewise, financial technology platforms prosper in Indonesia's mobile-first ecosystem where conventional financial services have been developed (Nuryakin et al., 2019). These experiences provide lessons for developed countries since even countries like the US face issues of an unbanked population (Piper, 2020) and the use of outdated equipment like cheques (Nuryakin et al., 2019). Distinctions, therefore, matter – not only since experience from developed countries cannot be merely transplanted into developing countries; but it also matters since it facilitates knowledge-sharing. The government cannot act alone in this initiative. Multi-donors, multilateral organisations, the private sector and civil society partnerships are needed.

- **Establishing public infrastructure of knowledge**

The private sector leads digitalisation in various aspects, from providing software and devices to operating social media and financial technology platforms. However, it still relies on public support and infrastructure, not only in terms of hard infrastructure but also in soft infrastructure like public education and literacy. Such infrastructure is necessary since private actors might not be capable—or incentivised—to acquire skills and knowledge that unlock the full benefits of digitalisation. In developed countries, individuals with lower education tend to utilise the internet for entertainment purposes (Cho, et al., 2003; Bonfadelli, 2002). This phenomenon may be due to preferences, however, this also may be due to a lack of awareness of how digitalisation can provide opportunities for income generation. Individuals may lack the knowledge of how to use productivity-enhancing opportunities provided by digitalisation. Thus, It is important to establish public infrastructure of knowledge that targets individuals' technology use and the messages delivered. Less educated groups may also become victims of fake news and fake information, which in turn, increases their vulnerability. Civil society organizations can serve as platforms that provide advocacy and accountability to protect vulnerable groups. Civil society organisations can provide advocacy on internet usage to minimise its adverse impacts such as children's exposure to porn, child laziness, fraud, social conflict, racial tension, fake news, hate speech and hate groups, hoaxes, ruthless political and cultural division, fake webpages, divisive ads and election meddling (Riyanto, et al., 2017). In developing countries such as Indonesia, households with the lowest income quintile use the internet for productive activities, such as for education and for income-generating activities such as selling goods. Therefore, better access to the internet will generate higher productivity for the lowest income

brackets. In both developed and developing countries, better access and better internet literacy are pivotal to narrowing the digital divide. Thus,

Policy options:

- G20 members should make a commitment to share financial, technical and institutional-capacity resources to improve the establishment of public libraries, free internet access hotspots, affordable internet packages and access for rural areas, among other initiatives so that public access to essential digital services is available.
- G20 members should develop more forward-looking digital literacy programmes that incorporate the characteristics of developed and developing countries that could be adopted as a common framework, establishing adequate community-based training and infrastructure knowledge, provide access to education including for the marginalised population.
- In doing so, G20 members can encourage the empowerment of the smallest units of community or nucleus community level to achieve better utilisation of the growing digitalisation.

- **Improvement in institutional capacity**

The pace of technological development and the accelerating business cycle means governments and regulation tend to be playing catch-up. The network effect and associated economies-of-scale imply that digitalisation rewards agglomeration and concentration in the core, meaning that there is a lack of technical capacity and know-how by related government and private stakeholders at the local and regional levels. This is especially the case in developing countries, where the state capacity is weaker, talent is more limited and regional inequality is more prevalent. As digitalisation is scaled up, permeating all levels of society, better understanding by the government, including at local and regional levels, is crucial to ensure that digitalisation can support resources for more equal social and economic distribution.

Policy options:

- G20 member countries should encourage the provision and mobilisation of technical assistance facilities that focus on specific aspects of conceptualising, planning and implementing the digitalisation agenda.
- G20 member countries should further improve horizontal and vertical cooperation between public institutions, considering the interregional and inter-level nature of digital ventures.

- **Better utilisation of alternative financing instruments.**

The lack of soft and hard infrastructure in developing countries, especially apparent in the gap between urban and rural areas is partly caused by inadequate funding. While annual investment in digital infrastructure has risen, it is estimated that the investment gap could reach US\$512 billion by 2040 for Asia alone (AIIB, 2020). Emerging economies with low-quality infrastructure are facing a bigger shortfall, since they have a large population with low per-capita investment and decreasing annual growth, signaling an issue in attracting investment.

Several financial instruments, such as social impact bonds and designated multilateral credit facilities, may provide solutions to the funding problems. Considering the variety of digitalisation programmes, an array of potential instruments can be applied to different projects at different stages. For example, corporate finance might not be available to finance a long-term broadband construction venture; instead, project finance might be more suited for this purpose.

Policy options:

- Private capital does not solve every problem of the digital divide and financing gap (AIIB, 2020), and hence, there is a role for direct and indirect public investments. To expand the fiscal capacity, governments can use innovative financing instruments, such as social impact bonds or multilateral credit digitalisation programmes. G20 member economies should escalate their commitment in developing and utilising innovative financing instruments.
- Encouraging private participation is essential, considering that 72 percent of infrastructure project investment since 2011 has come from the private sector (AIIB, n.d.). Instruments like viability gap funds, sovereign guarantees, and project support may serve as effective tools to leverage public finance by mobilising greater private finance. Considering the G20's influence, members should increase private participation through various derisking instruments to spur investment towards digital infrastructure development.
- **Establishing more progressive fiscal instruments to address the vicious cycles of digital divide.**

Fiscal instruments can be used to reallocate resources to sectors with greater capacity or power to achieve more equitable or inclusive growth. One of the policy options is to establish more progressive fiscal instruments such as tax incentives or subsidies to promote education benefitting disadvantaged groups of societies. Digitalisation requires higher education. Intervention in the education sector is very important to address digital inequalities since education is a dominant factor in gaps in access and usage both in developed and developing countries.

Since access to internet represents primary access to information and resources for education, internet access should be improved, especially for low internet penetration areas and low-income households. Better access to internet for remote areas and lower-income brackets will help reduce economic and social gaps among areas and households, especially in developing countries. In addition to physical infrastructure construction, less developed areas and groups also need advancement in soft infrastructure and favourable policies and regulations towards vulnerable groups. Tax incentives for the private sector engaging in internet infrastructure provisions will mobilise resource allocation for better access. Essential factors that support the development of digital infrastructure such as government policies and regulation should also be shaped to further enhance inclusive economic growth.

References

- Asia Infrastructure Investment Bank (AIIB). (2020). Digital Infrastructure Sector Analysis [Ebook]. Retrieved 27 April 2022, from https://www.aiib.org/en/policies-strategies/operational-policies/digital-infrastructure-strategy/.content/download/Full-DISA-Report_final-with-Appendix-2020-01-10.pdf.
- Anandaram, S., Chetty, K., Josie, J., Kripalani, M. (2021). *Digital Inclusion Strategies for the G20 – Lessons in Public-Private Cooperation from India and Africa. T20 Italy Policy Brief – Infrastructure Investment and Financing Task Force.*
- Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in Human Behavior*, 111, 1-9.
- Bonfadelli, H., (2002). The Internet and Knowledge Gaps. *European Journal of Communication*, March.
- Chernoff, A. W., & Warman, C. (2020). *COVID-19 and Implications for Automation* (No. w27249). National Bureau of Economic Research.
- Cho., J., Zuniga. H., Rojas, H., Shah, D. (2003). Beyond access” The digital divide and internet uses and gratifications. *IT and Society*, Vol. 1, Issue 4, March.
- Cieślik, A., & Kaniewska, M. (2004). Telecommunications infrastructure and regional economic development: The case of Poland. *Regional Studies*, 38(6), 713-725.
- Cohendet, P. (2003). *The digital divide in the European enlarged economic scenario: an assessment of the socio-economic effects.* Report for ESA.
- Diermeier, M., & Goecke, H. (2017). Productivity, technology diffusion and digitization. In *CESifo Forum* (Vol. 18, No. 1, pp. 26-32). München: ifo Institut-Leibniz-Institut für Wirtschaftsforschung an der Universität München.
- Ho, C., and Tseng, S. (2006). From digital divide to digital inequality: the global perspective. *Int. J. Internet and Enterprise Management*, Vol. 4. No.3.
- Ingram, George. (2021). Bridging the global digital divide: A platform to advance digital development in low- and middle-income countries. *Brookings Global Working Paper No.157.* Global Economy and Development Program at Brookings.
- Jamil, S. (2021). From digital divide to digital inclusion: Challenges for wide-ranging digitalization in Pakistan. *Telecommunication Policy*, 45, 1-16.

- Jensen, R. (2007). The digital divide: Information (technology), market performance, and welfare in the South Indian fisheries sector. *The quarterly journal of economics*, 122(3), 879-924.
- Koutroumpis, P. (2009). The economic impact of broadband on growth: A simultaneous approach. *Telecommunications policy*, 33(9), 471-485.
- McKinsey Global Institute (2018). *Solving the Productivity Puzzle: The Role of Demand and the Promise of Digitization*, McKinsey & Company.
- Muto, M., & Yamano, T. (2009). The impact of mobile phone coverage expansion on market participation: Panel data evidence from Uganda. *World development*, 37(12), 1887-1896.
- Nuryakin, C., Aisha, L., & Massie, N. (2019). Financial Technology in Indonesia: A Fragmented Instrument for Financial Inclusion?. Retrieved from https://www.lpem.org/wp-content/uploads/2019/06/WP-LPEM_036_May-2019_C-Nuryakin.pdf
- O'Sullivan, K., Clark, S., Marshall, K., & MacLachlan, M. (2021). A Just Digital framework to ensure equitable achievement of the Sustainable Development Goals. *Nature Communications*, 12(1). <https://doi.org/10.1038/s41467-021-26217-8>
- Piper, K. (2020). What Kenya can teach its neighbors — and the US — about improving the lives of the "unbanked". *Vox*. Retrieved 27 April 2022, from <https://www.vox.com/future-perfect/21420357/kenya-mobile-banking-unbanked-cellphone-money>.
- Remes, J., Mischke, J., & Krishnan, M. (2018). Solving the productivity puzzle: The role of demand and the promise of digitization. *International Productivity Monitor*, (35), 28-51.
- Riyanto, B., Purwanto, B.M., Adji, A., Aritejo, B., Ghuziny, D. Penelitian dan Pelatihan Ekonomika dan Bisnis, Universitas Gadjah Mada (P2EB FEB UGM) Research Report, 2017. *Mobile Internet Behavior and Its Impact on Social and Economic Development in Indonesia*.
- Shenglin, B., Simonelli, F., Ruidong, Z., Bosc, R., & Wenwei, L. (2017). Digital Infrastructure: Overcoming the digital divide in emerging economies. G-20 Insights. Retrieved from https://www.g20-insights.org/wp-content/uploads/2017/05/Digital_Overcoming-Digital-Divide-II.pdf
- Van Dijk, J. (2017). Digital divide: Impact of access. *The International encyclopedia of Media Effects*.
- West, D., & Heath, D. (2009). Moving Forward on Digital Inclusion: A framework for integrating research, policy and practice. *Journal of Social Intervention: Theory and Practice*, 18(2), 5-28.
- Zilian, S., & Zilian, L. (2020). Digital inequality in Austria: Empirical evidence from the survey of the OECD "Programme for the International Assessment of Adult Competencies". *Technology in Society*, 63, 1-12.