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Core IV–B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi–110 003, India
Ph.: +91–11–24682177–80, Fax: +91–11–24682173–74
E–mail: dgoffice@ris.org.in
Website: www.ris.org.in

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Leveraging on Infrastructure as a Driving Force

As observed in the past, infrastructure financing gaps continue to widen across countries in different regions of the world. As per a recent estimate by the Asian Development Bank, the Asia and the Pacific region will need additional funding of 2.4 per cent of the region's GDP to fully meet the transport infrastructure requirements of the growing urban population. Likewise, the World Bank assessment suggests that developing countries will be required to invest around 4.5 per cent of GDP to achieve Sustainable Development Goals linked to infrastructure. While funding requirements are unlikely to fall in the coming years, many governments in the developing world are facing resource constraints in the form of narrowed domestic fiscal space, high debt service burden, and uncertain foreign investment flows. Owing to the drastic fall in state revenues during the COVID-19 pandemic that has left very little maneuvering space in the countries for improving their domestic resources, the public funding of infrastructure development may be badly affected in the coming months.

Besides addressing funding constraints time has come to unlock the new facets of infrastructure-development linkages such as digitalization, financial infrastructure (Fintech), multimodal transportation, among others. The changing environment perhaps demand infrastructure development to be seen from a new perspective in all spheres, e.g. planning, designing, funding and execution of projects. Moreover, these new sectors seem to be promising from the perspective of their stronger developmental impacts in terms of income generation, job creation, market integration and export promotion. No country can afford to delay decisions on infrastructure development; hence greater attention will be required on convergence of different pillars of infrastructure physical, social and digital, and innovative financing instruments. G20 can steer this process of transition from the conventional thinking on infrastructure to an integrated forward-looking infrastructure agenda enabled by new-age digital technologies and financing innovations. In particular, the four developing country presidencies could leverage on infrastructure as a means to catalyse inclusive and sustainable development.

This issue of 'G20 Digest' discusses infrastructure from diverse perspectives. The first article envisages approaches towards infrastructure in the post-recovery period especially underinvestment in social infrastructure, importance of nature-

based solutions, digital infrastructure, among others. The article on basic saving account usage in Indonesia shares interesting observations on motives and extent of savings accounts from financial inclusion prism. Two articles on digitally enhanced infrastructure and digitalization-related challenges present the efficiency gains accruing from digitalization and associated policy risks. The last article highlights the clean and sustainable transition that the world is witnessing, drawing specific inputs from the transportation sector. We hope this issue will engage our readers and prompt meaningful debates among different stakeholders on policy choices in the infrastructure and related areas.

Enjoy reading it.

Priyadarshi Dash

Research Article

What to Do with Fifteen Trillion? Infrastructure, the G20 and a Window for Macro-Economic System Change

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Nicolas J.A. Buchoud*

Abstract: Globalisation has been in disorder since the 2008 financial crisis but the COVID-19 pandemic has added a global social crisis fueling imbalances locally and internationally. Contemporary fragilities are also a consequence from declining investments in social infrastructure in the past decade along with the acceleration of digitalisation. As the fragility of interdependent economies and societies has been exposed, it is time to look forward. The magnitude of added recovery and emergency spending calls for a refined understanding of the linkages between short and long term factors of transformation and a stronger assessment of urbanisation as a disruptive factor in global politics. Convergence between policy-making and research among the G20 and G7 forums could transform recovery investments into drivers of interconnected sustainability through macro-economic changes, while strengthening an effective multilateral development agenda.

Globalisation at Crossroads

It took a massive pandemic, the worst since the Spanish flu of 1918 only in a much more populated and urbanised planet, to highlight stark voids and inherent fragilities of contemporary growth and development processes. The Sars-Cov-2 virus and its subsequent mutations are obviously not the only factor of distress of globalization, which has been in disarray since the 2008 global financial crisis. The first headlines and paragraphs commenting on the state of the world's economy of the annual G20 leader's declarations over the course of the past decade offer a good overview of mounting levels of uncertainties, especially rising difficulties to deal about global issues through multilateral institutions and the recourse to protectionist tendencies (G20, 2021).[1] However, the enduring pandemic and the quest for optimal recovery investment policies tend to openly question macroeconomic choices and theoretical foundations that have largely prevailed since the end of the Cold War. Globalisation is not over, it is not only in disorder, it is at crossroads (Snower, 2020, Kelly and Snower, 2021).

* Fellow of the Global Solutions Initiative and O.P. Jindal Global University, and Co-chair of the T20 Indonesia infrastructure taskforce

Some factors are conjunctural. Disruptions in global supply chains are slowing down the necessary development of circular economy as players throughout value chains struggle to preserve profits (Buchoud, Charalambous, Kochhan, Lücke, and Karampourniotis, 2022). The return of inflation in North America and Europe as well as rising prices of oil and essential commodities in many developing countries including India goes along with rising and costly public and corporate debt levels in many emerging countries (ADBI, 2020; Akhtar, Bhattacharya, Buchoud, Hendriyetty and Yoshino, 2021). In China, a handful of large real estate industry companies hold nearly half a trillion dollars of debts and might not be able to pay it, further questioning the country's development model based upon urbanisation and infrastructure (Buchoud, 2020). The domestic situation has immediate impacts on the delivery of the Belt and Road Initiative, be it in South Asia or throughout Africa, with high pressure on many infrastructure projects and countries' financial situation.

Structural or systemic issues are also at stake. The present COVID-19 crisis has its roots in previous epidemics, such as the SARS crisis in Asia at the turn of the millennium, the MERS crisis in the Middle-East, the Ebola crisis in tropical Africa and so on (Oni, 2021). Initially, the rapid unfolding of the COVID-19 pandemic highlighted the lack of knowledge consolidation after those afore mentioned regional pandemic episodes. As the Sars-Cov-2 virus has mutated constantly since 2020 with the current variant Omicron leaving countries with uncertain prospects, cross examinations show the interdependency between its transformations and pre-existing public health issues such as the prevalence of AIDS which accelerates genomic changes. Re-examination of the origins of the pandemic in China highlight the thinner border between wildlife and humans globally, a catalyst for virus circulation and acceleration and an illustration of other man-made problems such as the degradation of terrestrial and water ecosystems (Bartlett, 2021). For example, it is now estimated that out of all the plastic that has been produced in the world since its invention in the 1950s, less than 10 per cent of it has been recycled and another 10 per cent has been incinerated, meaning that the remaining 80 per cent has been dumped and is now to be found everywhere, even in locations remote from human activities (Geyer, Jambeck and Law, 2017, Buchoud and Kuhle, 2022).

What is Left in the G20 Space

International enthusiasm followed the end of the Cold-War in the late 1980s, although the transformation from the USSR institutional regime into the Russian Federation was nothing simple. The changing geopolitical situation of the early 1990s nevertheless allowed for large scale policy innovations such as the creation of the conferences of the parties (COPs), a powerful multilateral response to cross-border environmental challenges (Buchoud, 2021). The Rio Earth Summit in 1992 was even followed by attempts to shape an international social agenda, which culminated with the Porto Alegre World Forum in 2001 after a decade of harsh protests against the last cycle of negotiations of the General Agreement on Tariffs and Trade (GATT) and the creation of the World Trade Organization (WTO) in 1995 .

As compared with the designated 'Seattle battle' of 1999 against the organization of a WTO ministerial conference in the city, the social,

generational and geopolitical tensions that have presided over COP26 held in Glasgow in November 2021 show deeper tensions and highlight the limitations, if not the exhaustion of global environmental governance. There is mounting awareness among the citizens and governments that contemporary growth models are creating wealth beyond planetary boundaries but there is no easy way to reverse existing mega trends.

The G20 policy context is a good reflection of how globalisation has been framed and shaped over the past two decades, first in response to the Asian financial crisis of the late 1990s, then to the global financial crisis 10 years later.

As Indonesian presidency of G20 in 2022, followed by India and by Brazil, it is tempting to advocate for a comprehensive transformation in development pathways (Sudarshan, 2021, Teixeira, 2021). The existing multilateral framework of the Agenda 2030 and the corresponding sustainable development goals, however necessary they may be, are showing limitations both in terms of financing and structure, an issue that was already pointed out before the pandemic (GSDR, 2109). In present times, joining forces across the G20 and the United-Nations system could help stir global governance and foster large scale policy transformations such as in the early 1990s, or the early 1970s with the creation of the United Nations Environmental Programme (UNEP), or the late 1940s with the creation of the United Nations itself. Even before the current COVID-19 pandemic, it had become commonplace to highlight 'trillions' of financing gaps in achieving the SDGs, especially in fields such as infrastructure development. The development finance gaps have only been worsened by the global health crisis and it is believed that it cannot be bridged. A system-change task lies ahead for the G20, which goes beyond the coordination of sectoral adjustments and targeted reforms in the existing international monetary system, as underlined by the science and social and human science academies of G20 countries (S20, 2020, SSH20, 2021).[2]

In 2008, the macro economic, financial and monetary responses to the financial crisis have been rather efficient in the short run. Decisions jointly made by the G20 country leaders at their very first meetings in Washington D.C, London and Pittsburgh did stabilise a global financial system that was in turmoil. Yet underlying structural factors of complexity that have also contributed to the 2008 crisis have barely been included among global priorities which has further hindered governments' abilities. The time and energy spent by national governments and multilateral financial institutions in addressing the financial crisis could not be duplicated in other spheres such as multilateral environmental agreements. Hence, the United Nations' steering of the climate change convention could not prevent the costly failure of the Copenhagen climate (COP15) in 2009 (Storch, 2015). This is a reminder of current risks linked with the management of the COVID-19 crisis, with even higher stakes in terms of environmental and ecosystem degradation, carbon emissions, and social and geopolitical cohesion.

A significant portion of global governing time that has been spent since the pandemic outbreak to manage its dire immediate economic impacts. Another large portion of time has been allocated to frame public health responses in the forms of preventing and curating measures such as lockdowns, social distancing and vaccination. So far, this has probably left too little time for

the complex intermediation needed to govern effectively man-made planetary challenges.

In the past two years, the G20 has served more as a convening platform than as the decision-making arena it has been in 2008-09. For instance, while the issue of infrastructure investment emerged at the G20 Seoul Summit in 2010 and was subsequently refined during the presidencies of Australia and Japan in 2014 and 2019 with the successful issuance of the quality infrastructure investment principles (Akhtar, Bhattacharya, Buchoud, Hendriyetty, and Yoshino, 2021) the COVID-19 pandemic has spurred a different rationale. The European Union has issued its own 'Global Gateways' agenda in 2021, echoing the United-States' own one trillion dollar infrastructure package. The G7 has brought up a 'Build Back Better World' infrastructure agenda, aiming at responding to China's still expanding and adjusting its Belt and Road Initiative (Buchoud, 2021). It would not be superfluous to assess, beyond the reach of the present article, what is concretely left within the G20 regarding infrastructure choices and investments and to question the relevance of related tools, hubs and partnerships. Similarly, the role of the G20 regarding health issues has proven useful but also limited. Existing initiatives such as Covax have not permitted for universal access to vaccination which in many cases means very low levels of vaccination such as in Africa and other emerging regions, according to the World Health organization (WHO).[3]

Bending the Classical Economy

We argue that urbanisation is among the most undervalued mega-trends although it has far-reaching consequences in many aspects of contemporary global affairs. For the G20 to overcome the current COVID-19 pandemic and nurture the emergence of renewed development models, it cannot bypass urbanization.

In 2021, T20 Italy has shared our proposal of a G20 pact on sustainable urbanization with the G20 Finance Ministers in October 2021 (T20, 2021 (2) and T20, 2021 (1)). This proposal was not acknowledged in the final Rome Declaration, although the current turmoil in Chinese real estate markets somewhat echoes the prevailing real estate investment context in the United-States before the 2008 crisis. In 2007-08, a speculative oversupply of housing located nowhere near public services and other amenities is largely what has sparked the subprime crisis, once it was discovered a large quantity of assets was junk and as it was remarkably depicted by *The Big Short* book (2010 and movie (2015). That the global financial crisis was to some extent the result of a housing bubble and a strategic urban planning problem should have raised more international attention about the potential of urbanisation to destabilize the global order. Instead, the New Urban Agenda that was adopted in 2016 by the United Nations paid little attention to real estate economics, not to mention it is completely silent on infectious diseases and pandemic risks.[4] The engagement group of mayors in the G20, namely the Urban 20 (U20), has also been remained silent on that issue since it was incorporated in 2017-18.

Unregulated real estate industries across the globe from California to China is a massive driver of resources consumption, from raw materials to energy to land and it is also a source of debt creation tied to fragile assets. This is one of many illustrations of how the

invisible hand of markets contributes to concretely plunder resources without much restrain, literally cementing unsustainable consequences for the next decades. Addressing such trends through designated green or impact finance, green or smart urban design, is not enough. 'Smart cities' have predominantly dragged governments, companies and research attention since the turn of the millennium but this has been largely done at the expense of the development of other models.

There were many pre-COVID-19 crisis signs of the complexity to restore and maintain global economic growth levels after 2008, as compared to the previous three decades since the end of the Cold-War. One of them was the constant decline in social infrastructure investments, often in the name of innovation that would yield better results in the future. Such decline has been well assessed in Europe, despite the existence of national and EU wide safety-nets and welfare systems. Studies conducted by the OECD have shown that local investment capacities have been durably altered by the 2008 crisis at the expanse of many public services and amenities. The latest of such assessments was presented at a G20 conference on local infrastructure investments in Genoa in September 2021 but it has not been officially published yet.

While the current COVID-19 crisis has abruptly replaced sanitation as a collective, daily priority, it has not yet brought up more significant changes in public administration models. In France, the number of available hospital beds has even declined since the pandemic outbreak and lower income personnel such as nurses, who play a critically important role, have massively quit. The number of tenured teachers in schools, junior high schools and high schools resigning from their position has been at record highs in 2020 and 2021. The validity of a number of managerial and macro economic reform concepts that have prevailed since the beginning of the 1990s, which includes the designated 'Washington consensus' (Williamson, 1989) may be questioned, which calls for another continuation of the present paper through the upcoming G20 presidencies. Even before the 2008 financial crisis and in anticipation of perceived associated risks, experts, governments, institutions, had started to look at growth and development models that would go 'beyond GDP' (Buchoud, 2021 (1)). In the past years, the Re-coupling model promoted by the Global Solutions Initiative (GSI) or the support to a well-being economy brought up by the OECD have been fresh and ambitious attempts to transform macro economic models more deeply. Replacing the classical economy model of individual agents pursuing selfish interests by individuals consciously pursuing pro-social motives will nevertheless require continuous and concerted efforts to seize the COVID-19 moment.

What to Do with € 15 Trillion?

The COVID-19 crisis has triggered disruptions at a global scale, at a pace no one could have foreseen but over € 15 trillion have been spent in immediate relief and longer-term recovery plans across the globe, in particular in developed countries. We argue this overall amount should be considered as the price for the entrance ticket to build a different world order of priorities. Fifteen trillion is an indication of the real costs of fixing the economy in contemporary world. It is a reflection of the magnitude

of under-investments in social infrastructure and in the development of social capital and education in the past years to actually cope with meta- man-made transformations, in particular the transition towards a digital world geared by and accelerating urbanization.

Pre-crisis, the repetition *ad nauseam* of finance gaps in notes and reports should have called for more decisive coordinated system-change approaches but there is no easy way to do such thing. Despite high-level substantiated calls and initiatives since the turn of the millennium to replace GDP measurement, it largely remains the cornerstone of growth measurement and a compass for countries macro-economic policies and statistical apparatus. Yet of all its flaws, GDP measurement has faced another problem since the outbreak of the pandemic. It does not allow to quantify countless initiatives that were taken by cities, communities and neighborhoods to provide relief (Buchoud, Bartlett, Cohen, Croci, Sonobe, eds., *et al*., 2021). GDP largely overlooks factors of resilience to the crisis. It is not appropriate at all to measure countries and people's capacities to team up and build innovative socio-economic responses to the crisis including circular economy (Anbumozhi, Buchoud, Charalambous, Croci, Jain, H. *et al*., 2021) or creative economy (Buchoud, Eryuce, Gebetsberger, Newbegin, 2021) or both.

Reports from international financial institutions such as the International Monetary Fund or the World Bank since 2020 have shown that the pandemic has caused a backlash in poverty alleviation globally, as well as the return of extreme hunger in several regions, notwithstanding the weakening of many political regimes. While the economic recovery is very uneven across the globe, there are also winners, especially in the digital world, which heightens the competition for leadership and sovereignty among and within nations. Military spending is reaching new heights every year, a trend that has not been reversed by the pandemic.

Fifteen trillion euro might look as a lot of money, which it is, but this amount has to be related with other figures, such as the capitalization of major digital companies worldwide, a number of them being over the trillion mark. The largest global asset management companies hold a portfolio that has grown since the beginning of the crisis, with one of them reaching the $ 10 trillion mark.[5] Even wealthy universities such as Harvard or Yale have seen a steep rise of their endowment funds, those two universities only totaling nearly one hundred billion dollars. By comparison, one of the repeated reasons accounting for the sluggish implementation of the 2015 Paris Agreement - that is the need to support lower income countries in achieving low-carbon transitioning - is that wealthy nations would not finance the one hundred billion dollars a year they pledged to do at the COP21. Calculations during the G20 Italy by the D20 group of long-term (public) investors have shown that the total financial capacities of all public development banks worldwide amount to €5 trillion, another indication of major imbalances between public and private spheres of investments (D20, B20 and T20, 2021).

A transformational system approach is what an intellectual, sensible and rational journey in the depth of the current crisis calls for but implementing such changes must take into account multiple angles from the need to be innovative and forward thinking in striking a new public-private balance to the lack of clear directions in a fragmented global order.

How the various infrastructure investment plans across the globe can intersect is a critical issue behind recovery and climate talks, and may be the only way to rebalance growingly unstable planetary urbanisation systems. Working at the edges and at the crossroads of several policy and geo-economic dimensions at the same time can contribute to move from extracting to intersecting and to create favorable conditions for harmonious and peaceful development. The extracting paradigm applies for raw and natural resources as well as human resources, in particular in a highly-computerised and data rich world. As a consequence, knowledge hyper-segmentation and hyper-specialization must be rebalanced by a refined understanding of our interrelatedness and interdependencies.

In 2022, the G20 is being chaired by Indonesia and then by India in 2023. Meanwhile, the G7 will be chaired by Germany and then by Japan. As it chaired the G7 in 2017 and the G20 in 2019, Japan pushed a number of valuable elements on the global stage, as illustrated by the issuance of the quality infrastructure investment principles, the result of several years of incubation. As it chaired the G20 in 2017, Germany conducted thorough explorations of contemporary mega-trends and interconnections, trying to convert research outcomes into future policies. This yielded rather interesting results on public health with the Berlin Declaration of the G20 Health Ministers pointing out precisely to the risks and impacts of a global pandemic.[6] The G20 Germany also launched the Global Solutions Initiative to support the outreach of the T20 and channel its recommendations to the G20 Leaders. We believe such experience of global policy frameworks and transformation should be combined with, not separated from, the vision and inputs of two major emerging countries such as India and Indonesia, which both have played a critical role in the past decades in support of development policies and non-alignment.

Bending the linear economy towards sustainability might not be possible in a short period of time, especially as governments are struggling with immediate priorities, among them the sanitary management of the COVID-19 pandemic and keeping the global financial system under control. However, ignoring the equally pressing need for long-term transformations to be built *with* and not only *for* people, might weaken the relevance and effectiveness of forums such as the G20 or the G7.

For the world to profit from the €15 trillion responses to the COVID-19 pandemic as a starting point for rebuilding a solid sustainable development agenda, the *Intersecting* process kick-started in 2020 and showcased at the 2021 Nobel Week Dialogue offers promising perspectives.[7] The €15 trillion entrance ticket to different development pathways will be wasted unless better interaction between the global economic agenda as embodied by the G20 and research is formalised. Here again, urbanisation issues could play a catalytic role. Growingly fruitful research that was developed before the pandemic (Elmqvist, Bai, Frantzeskaki, Parnell, et al., 2018, Bai, Colbert, Mc Phearson, Webb et al., 2019) before it was abruptly disrupted could only benefit from the enlarged perspectives triggered by the crisis at the junction of macro-economic transformations and investments, to create the physical and social infrastructure of a new sustainable economy.

Endnotes

1. For instance, the G20 2021 Rome Leaders Declaration's paragraph 3 on the Global economy displays a typical phrasing highlighting contemporary imbalances: 'Over 2021, global economic activity has been recovering at a solid pace, thanks to the roll-out of vaccines and continued policy support. However, the recovery remains highly divergent across and within countries, and exposed to downside risks (…)'.
2. 'In 2008, the world experienced a global financial crisis, a critical transition that warranted the G20 discussions to be elevated to include G20 leaders Twelve years later, we are faced with another critical transition of far-reaching impact in COVID-19. These transitions are abrupt shifts in the state of our ecosystems and become critical when they have global or far reaching impacts'. 'The fragility of interdependent economies and societies has been exposed, for example, financial market instability and increased indebtedness, struggle for resources, large-scale reduction or misuse of common goods, supply-chain challenges, and uncontrolled migrations, particularly severe in those countries most affected by this phenomenon.'
3. WHO. Africa COVID-19 Vaccination Update.
4. In 2016, the German Federal Scientific Board WBGU described the stakes of the Habitat III Summit as very high and the its outcomes as very disappointing, concluding that the summit largely failed at elevating urbanization higher in the global agendas.
5. Lim, D. (2021, July 14). BlackRock Closes in on the Once Unthinkable, $10 Trillion in Assets.
6. The global interconnectedness of societies, businesses and governments means that an infectious disease risk anywhere can become a health risk everywhere – with far-reaching humanitarian, social, political, economic and security consequences.'
7. Nobel Week Dialogue 2021, The City of the Future, Dec. 9, 2021, Gpthenburg Svenska Mässan and online. Intersecting cuts through strategic policy areas from developed and emerging countries. It builds upon multi-sectoral, multi-disciplinary, and multi-stakeholder approaches. It has been launched by the Global Solutions Initiative and GIZ and is distributed by the Global Solutions Initiative. It is geared towards think tanks, civil organizations, international institutions, in particular the G20/T20. It addresses established and future generations of leaders in public and private spheres.

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Financial Inclusion and Poverty Alleviation: Optimizing Basic Saving Account (BSA) Usage by Poor Households in Bali, Indonesia

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Chaikal Nuryakin*, Prani Sastiono, Yuli Rosdiyanti#, Fitawhidan Nashuha#, Muhammad Daffa Ihsan#, Kartika Putri Larasati#**

Abstract: Financial inclusion for the poor is one of the key aspects that the government is pursuing. "Layanan Keuangan Digital" (LKD) and "Laku Pandai" by Bank Indonesia and OJK are some examples of policies issued to promote financial inclusion, especially for the poor households. Kartu Keluarga Sejahtera (KKS) is a card which identifies poor households. By having KKS, a household is considered eligible for social assistance from the government. KKS is a debit card of an account to which the government will transfer social assistance. In other words, by having KKS, a poor household will receive social assistance, which later will be transferred to an account given by the government. To discover the extent of KKS's penetration and effects on financial inclusion (access, usage, and quality) amongst the poor, LPEM FEB UI designed a pilot study to explore the current condition of distribution and usage of KKS. The survey was done in seven sub-districts in Gianyar, Bali: (1) Blahbatuh, (2) Gianyar, (3) Payangan, (4) Sukawati, (5) Tampaksiring, (6) Tegallalang, and (7) Ubud. For the policymakers, some recommendations produced by this pilot study are: first, educate the public - especially the beneficiaries of the programme - to ensure that they fully understand what features they could utilize to improve their standard of living. Second, utilise the existence of 'Banjar' in Bali or its equivalent in other places. Third, provide the facility and infrastructure, at least an ATM Machine and Laku Pandai agent, to facilitate financial and digital inclusion for people with saving accounts..

Background

The issue of poverty is a multi-dimensional problem that continues to be a concern for policymakers. In March 2021, it was estimated that 27.54 million people were living below the poverty line in Indonesia. Of those it is estimated that Bali contributes around 202,000 of them (BPS, 2021). Despite government efforts to alleviate the poverty rate through social assistance, society has not been able to escape from

* Head of Research Group for Digital Economy and Behavioral Economics, LPEM, Faculty of Economics, University of Indonesia

**Deputy of Research Group for Digital Economy and Behavioral Economics, LPEM, Faculty of Economics, University of Indonesia

#Junior Researchers, LPEM, Faculty of Economics, University of Indonesia

the life cycle of poverty. One of the ways to deal with poverty alleviation is an inclusive financial system, where people can access formal financial products and services. Empirically, financial products and services can help individuals build financial resilience and are often seen as crucial for improving marginalized groups' well-being, especially the poor. Saving allows people to increase their financial stability when income shocks occur and enable them to carry out long-term financial planning (Steinert, 2018). It also increases investment in health and vulnerability to health shocks (Dupas and Robinson, 2011).

In the past decade, the Government of Indonesia has exerted significant efforts to improve individual welfare through expanding access to formal financial services. The significant efforts are made to encourage branchless banking services for financial inclusion (*Layanan Keuangan Tanpa Kantor Dalam Rangka Keuangan Inklusif/Laku Pandai*). Branchless banking allows banks to penetrate remote and rural areas through their agent representatives. The government has also initiated digital financial services (*Layanan Keuangan Digital/LKD*), which ensures that financial and payment services can be done digitally. One of the products promoted by the program is BSA (Basic Saving Account)[1] that accommodates the characteristics of financial transactions of the poor and unbanked populations. Not only that, but the government's support also to increase financial inclusion is through digitizing the distribution of social assistance. The Ministry of Social Affairs/*Kementerian Sosial* launched a prosperous family card/*Kartu Keluarga Sejahtera* (KKS) in 2014, which identifies households in the bottom 40 per cent of the socio-economic status ranking. By having KKS, a household is considered eligible for social assistance from the government. KKS itself is a debit card of an account to which the government will transfer social assistance. In other words, by having KKS, a poor household will receive social assistance, which later will be transferred to an account given by the government.

However, the surveys conducted by SNKI in 2018 found that only 55.7 per cent of adults own a bank account. From those who owned a bank account, only 5.2 per cent of adults owned BSA products, despite 20.1 per cent of adults being aware of BSA products (SNKI, 2018). Not only low account ownership, but Indonesia is also facing the low usage of bank accounts opened for KKS beneficiaries which only stands for 17 per cent (Microsave, 2019). In the same report, beneficiaries had misinformation to withdraw the entire social assistance balance in one transaction. Dupas et al. (2018) suggested that a policy that only focuses on expanding access to bank accounts (supply-side intervention) will not affect a significant increase in account opening, let alone in savings as the highest level of financial inclusion. More attention should be paid to the demand side of financial services.

Anecdotally, most beneficiaries are not fully aware that accounts opened for social assistance can act as regular bank accounts to carry out various financial transactions. The research team expects that it is one of the driving forces causing the low use of BSA for financial transactions in general, other than aid withdrawal. To the best of our knowledge, the research that explores the awareness of KKS regarding the function of social assistance accounts and their financial transactions behaviour is still minimal, especially in Indonesia. To that end, this paper investigates g the extent of KKS' penetration and its effects on the

poor's financial inclusion (access, usage, and quality).

Some crucial findings can be derived from this study. **First**, many people do not realize that by having KKS, they should have a BSA. **Second,** most people withdraw all of their social assistance in a single withdrawal, even though KKS can act as a bank account, especially a debit card, where the beneficiaries can perform various financial transactions. **Third**, although ATMs are the most used medium to withdraw cash, ATMs and bank offices are not as accessible as the other facilities. **Fourth,** the head of Banjar/RW and village officers are two of the most trusted parties by the public to relay information about social assistance. Although those issues are specific to the study area in Indonesia, the findings provide interesting insights at the micro-level for G20 initiatives on financial inclusion.

Data and Methodology

LPEM FEB UI designed a pilot study to explore the current condition of distribution and usage of KKS amongst the bottom 40 per cent in Gianyar, Bali. To answer the objectives of the study, the research team conducted quantitative surveys in December 2021 in seven sub-districts in Gianyar, Bali: (1) Blahbatuh, (2) Gianyar, (3) Payangan, (4) Sukawati, (5) Tampaksiring, (6) Tegallalang, and (7) Ubud. The research team collected extensive data on 416 respondents, consisting of 166 respondents who did not have KKS and 250 respondents who had KKS. Among those who stated that they did not have KKS, 126 said they received social assistance from the government.[2] The household questionnaire administered to both social assistance beneficiaries and non-beneficiaries on modules on (1) location; (2) household head demographic characteristics (e.g., age, sex, education, work status, status as social assistance recipients); (3) household characteristics (e.g., number of children, house characteristics, asset ownership); (4) household welfare measured by household expenditure; (5) financial and digital inclusion and (6) knowledge about social assistance. We then analysed the collected data descriptively (see the graphs in the appendix), particularly on the awareness of the PKH account, which can act as a regular bank account, the behaviour of financial transactions carried out by beneficiaries of social assistance, the condition of financial facilities, and respondents' knowledge of social assistance.

Key Findings on Financial Inclusion

Many people do not realise that by having KKS, they should have a BSA. BSA, a saving account with several limitations, was given to expose the poor to financial services. However, as shown in Figure 1, of 250 KKS beneficiaries, 35.2 per cent said that no one in their household has a saving account. Of those who stated they have a saving account (162 out of 250 KKS beneficiaries), 9.3 per cent said that their saving account was not a BSA (even though they have BSA). Furthermore, of the remaining beneficiaries who were aware of the existence of BSA, 21.1 per cent of them said that they got their BSA from other channels, not given by the government.[3] In other words, around 53.6 per cent (134 out of 250) government's social assistance beneficiaries in our sample did not realize that they owned a BSA account. However, the government disburses their assistance through a BSA account (card). Even if they are aware that they own BSA by being a government's

social assistance beneficiaries, they do not utilize their BSA. The lower half of Figure 1 shows that 25 per cent of samples are aware of their given BSA rarely or never use their BSA. This finding shows that there are (and quite a lot of) people who do not understand the aid they have been given. This phenomenon could result in the under-utilization of features that follows the aid. Otherwise, it could be used to improve the quality of life for the poor, such as the features to simplify electricity, water, phone bill, or phone credit payment or purchase. Figure 2 also shows that most people could not fully understand what social assistance is and the details that follow. However, there are indications that people are willing to learn about the programme to utilize its features optimally. People express their curiosity about social assistance programmes, and they are fond of social assistance policy.

Most people withdraw all of their social assistance in a single withdrawal, even though KKS can act as a bank account, especially a debit card, where the beneficiaries can perform various financial transactions. Figure 4 denotes that 75 out of 100 beneficiaries withdraw their fund in one go. The finding is in line with the survey conducted by Microsave (2019), which stated that 82 per cent of the beneficiaries withdraw their entire social assistance balance in a single withdrawal. Our findings suggest that more than half of the beneficiaries said the high needs led them to withdraw their funds entirely (Figure 5). Being asked by the officers (28 per cent) is the second common reason behind withdrawing their social assistance in one go. The result can indicate the existence of a misconception among beneficiaries that the government will take their funds if the aid is not withdrawn within a certain period. Our survey revealed that 2 out of 10 beneficiaries fear that the government will take the fund if they do not immediately withdraw it. The research team found that 18 per cent of beneficiaries do not know the function of their social assistance account, which can be used for various financial transactions, such as transfer, savings, payment, etc. All this time, they only know that the account can only be used for a social assistance fund withdrawal. It can be confirmed from previous findings related to the lack of awareness that the account opened for social assistance distribution is the same as BSA.

Although ATMs are the most used medium to withdraw cash, ATMs and bank offices are not as accessible as the other facilities. Figure 3 indicates that an ATM is still the most reliable facility for cash withdrawal. However, ATM is the second most inaccessible (distance) alternative to do financial transactions. Even worse is the bank office. Facilities or institutions relatively close to the community are Cooperation, LPD (*Lembaga Perkreditan Daerah*/Micro Finance Institution), Laku Pandai Agent, and Social Assistance Distribution Centre. Most poor households could not access financial and digital services by phone, emphasizing the need for more accessible ATMs.

Head of Banjar/RW and village officers are two of the most trusted parties by the public to relay information about social assistance. It seems like Banjar plays an active role in the community in Bali; they communicate with, manage, and facilitate administrative and cultural business. The Head of Banjar, or in other parts of Indonesia, usually known as the head of hamlet (RW), is also one of the most trusted sources of information by the poor regarding social assistance. By collecting data of the poor households and then helping the aid disbursement

process, Banjar officers and even the head of the Banjar are directly involved and have chances to communicate and socialize with the poor. Additionally, their involvement in coordinating cultural and religious rituals in their area also increases people's perception of their credibility.

Financial Inclusion Initiatives in G20

The Global Partnership for Financial Inclusion (GPFI) was created in 2010 at the Seoul G20 Summit as an inclusive platform for G20 countries, interested non-G20 countries, Implementing Partners and Affiliated Partners. The GPFI is committed to advancing financial inclusion globally by increasing quality access to and use of sustainable formal financial services, thereby expanding opportunities for underserved and excluded households and enterprises as an instrument to ensure the well-being and sustainable development.

When dealing with people with limited digital access and skills, OECD (2021) provides some examples to be used by policymakers to overcome the barriers. These examples are:

- Making digital financial literacy tools accessible by choosing very simple technologies.
- Designing digital interventions that involve a combination of digital and face-to-face elements.
- Establishing partnerships with external organizations to overcome the lack of digital skills in the target audience and "bring" the digital resource to users.

Complementing digital financial literacy initiatives with traditional mass media such as radio or television can extend the reach of digital financial literacy resources.

"Recover Together, Recover Stronger," as a tagline of the G20 Presidency, shows the commitment from countries to rise from an economic downturn due to the health crisis of the COVID-19 pandemic. One of the priority agendas in strengthening economic resilience is strengthening financial and digital inclusion. As per OECD (2021), digital financial services have allowed governments to disburse funds to those in need quickly and effectively and allowed many households and firms to rapidly access online payments and financing (IMF, 2020). Consumers, especially the most vulnerable, need to understand the benefits and risks of digital financial services, how to make online transactions safely, and how to fully utilise digital financial services.

In Indonesia, the Financial Services Authority (OJK) has several initiatives for a variety of target groups, such as migrant workers, students and youth, farmers and fishers, people who live in the remote and outermost areas (3T), people with disabilities, women, MSMEs, and the retirees. Education programs, socialization, and promotion are carried out through various platforms. Social media plays an essential role in reaching people with adequate digital skills, and conventional mass media, such as television, public service advertisements, and radio, are used to reach those who still prefer them.

The conventional approach through local district head or village officers are considered more effective in reaching the bottom 40 per cent group than digital platforms related to socialization of financial inclusion. Our findings in the context of Indonesia show that television, social media, and radio are

not reaching the bottom 40 per cent. Moreover, our sample seems to trust their local district head or village officer to convey information, mainly digital and financial services. Thus, it implies that the policymakers in Indonesia should focus more on face-to-face interventions, especially for the bottom 40 per cent. Moreover, these micro-level findings could provide useful basis for GPFI in the coming years.

Desired Policy Choices

First, educate the public - especially the programme's beneficiaries - to ensure that they fully understand what features they could utilise to improve their standard of living. The survey revealed that many beneficiaries do not fully understand other benefits following cash or non-cash transfers. Policymakers could utilize several channels to convey important information to beneficiaries.

Second, utilize the existence of 'Banjar' in Bali or its equivalent in other places. The local community in Bali seems to rely heavily on the existence of Banjar officials. Their involvement, including the head of the Banjar, in administrative works and cultural and religious rituals, gains the Banjar official's trust from the community they belong to. This trust and dependency on Banjar officials could be used as a channel to convey critical information, especially in this case, about aid, social assistance, and BSA. Apart from taking advantage of 'Banjar,' village officers can also convey information related to social assistance. Village officers became the people trusted by residents after 'Banjar' in obtaining information, especially related to social assistance.

Third, provide the facility and infrastructure, at least an ATM and Laku Pandai agent, to facilitate financial and digital inclusion for people with saving accounts. The need for facilities and infrastructure amongst the poor is an old story. Even if the poor fully understand what they could do with their BSAs and desire to use them well, it would still be difficult if there were no facilities and infrastructure to make it real. It might be too much to ask for more bank offices around the area, where its existence is not efficient from a cost-benefit perspective. To that end, the presence of the Laku Pandai agent, as the extension of the bank, can help the community in the remote area to carry out financial transactions. Agents, usually local people, have advantages over other facilities like bank offices and ATMs. People usually trust their neighbours to save their money. There is no need to queue too long, close in terms of distance, assistance in performing transactions from agents, and the ability to transact financial services informally because some people feel reluctant to transact at the bank. However, providing other 'complementary' facilities and infrastructures might also help. With the more accessible and cheaper transportation to and from banks or ATMs, better roadways, streetlights, people will have to bear smaller opportunity costs to access an already-made program or aid. By then, people will start optimising the use of BSA.

Conclusion

KKS is a card which identifies poor households. By having KKS, a poor household will receive social assistance, which later will be transferred to an account given by the government. However, many people do not realise that by having KKS, they should have a BSA.

Additionally, some of those who realise that the KKS program includes BSA rarely use their BSA other than for cash withdrawal. We also find that around 75 per cent of the sample households withdraw their social assistance balance in a single withdrawal. More than half of them said that they need the money to fulfil their needs, 18 per cent of the respondents thought that BSA is only for social assistance disbursement, and 20 per cent said that they were afraid that the remaining balance that had not been drawn would be withdrawn back by the government. These findings indicate an under-utilisation of BSA amongst KKS beneficiaries. Otherwise, it could be used to improve the quality of life for the poor, such as the features to simplify electricity, water, phone bill, or phone credit payment or purchase.

Policymakers need to educate the public - especially the programme's beneficiaries - to ensure that they fully understand what features they could utilize to improve their standard of living. The existence of 'Banjar' in Bali or its equivalent in other places (district head), village officers, and other public officers can be utilised to convey critical information, especially in this case, about aid, social assistance, and BSA. Finally, the facility and infrastructure needed for people to access and utilize their BSA should be provided. The presence of an ATM and Laku Pandai agent, as the extension of a bank, can help the community in the remote area to carry out financial transactions.

However, it is imperative to understand that the research took a sample of respondents who live in Bali, especially Gianyar. Findings of the survey could be significantly different if the respondents are taken from other parts of Indonesia and other G20 and non-G20 countries. It is equally challenging to obtain data heterogeneity, which is essential to elicit power by sampling. However, the random sampling method used may reflect population representativeness and reduce researchers' bias. Further research can be developed by taking respondents from other provinces in Indonesia. In addition, in determining respondents, it must be ensured that each population group can be represented from the sample taken. Similar evidence from other countries could perhaps enrich the coverage of GPFI and help G20 consider other necessary policy interventions.

Endnotes

1. BSA is a Laku Pandai no-frill saving product that does not charge administration and transaction fees. It does not have a minimum limit for balance and cash deposits but has a maximum limit for balance and debit transactions.
2. We assume 376 respondents were social recipients and were included in DTKS (data terpadu kesejahteraan sosial/social welfare integrated data).
3. Even though the government should have made their BSA.

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Appendix

Table 1: Sample Characteristics

District	n	Do Not Have KKS	Have KKS	Male HH	Female HH
Sukawati	64	**26**	**38**	**55**	**9**
		40,63%	59,38%	85,94%	14,06%
Blahbatuh	45	**22**	**23**	**39**	**6**
		48,89%	51,11%	86,67%	13,33%
Gianyar	86	**27**	**59**	**82**	**4**
		31,40%	68,60%	95,35%	4,65%
Tampaksiring	55	**38**	**17**	**48**	**7**
		69,09%	30,91%	87,27%	12,73%
Ubud	50	**29**	**21**	**46**	**4**
		58,00%	42,00%	92,00%	8,00%
Tegallalang	76	**11**	**65**	**70**	**6**
		14,47%	85,53%	92,11%	7,89%
Payangan	40	**13**	**27**	**32**	**8**
		32,50%	67,50%	80,00%	20,00%
Total	**416**	**166**	**250**	**372**	**44**
		39,90%	60,10%	89,42%	10,58%

Source: LPEM Survey Data (2021).

Table 2: Distribution of Sample Who Do Not Have KKS

District	n	Do Not Have KKS	Do You Get Social Assistance?	
			No	Yes
Sukawati	64	**26**	**2**	**24**
		40,63%	7,69%	92,31%
Blahbatuh	45	**22**	**1**	**21**
		48,89%	4,55%	95,45%
Gianyar	86	**27**	**10**	**17**
		31,40%	37,04%	62,96%
Tampaksiring	55	**38**	**14**	**24**
		69,09%	36,84%	63,16%
Ubud	50	**29**	**4**	**25**
		58,00%	13,79%	86,21%
Tegallalang	76	**11**	**3**	**8**
		14,47%	27,27%	72,73%
Payangan	40	**13**	**6**	**7**
		32,50%	46,15%	53,85%
Total	**416**	**166**	**40**	**126**
		39,90%	24,10%	75,90%

Source: LPEM Survey Data (2021).

Figure 1: Saving Account Amongst the Poor and BSA Ownership Amongst Household with KKS and Saving Account

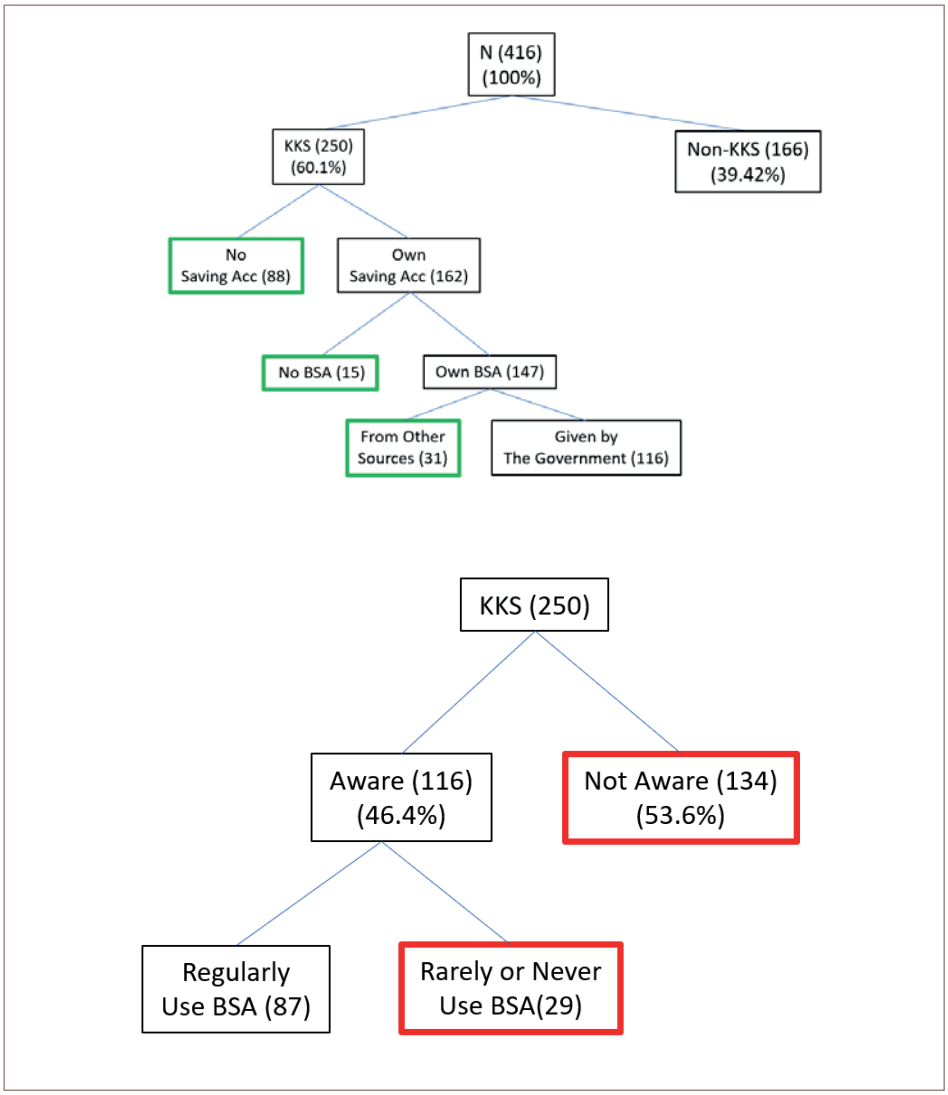
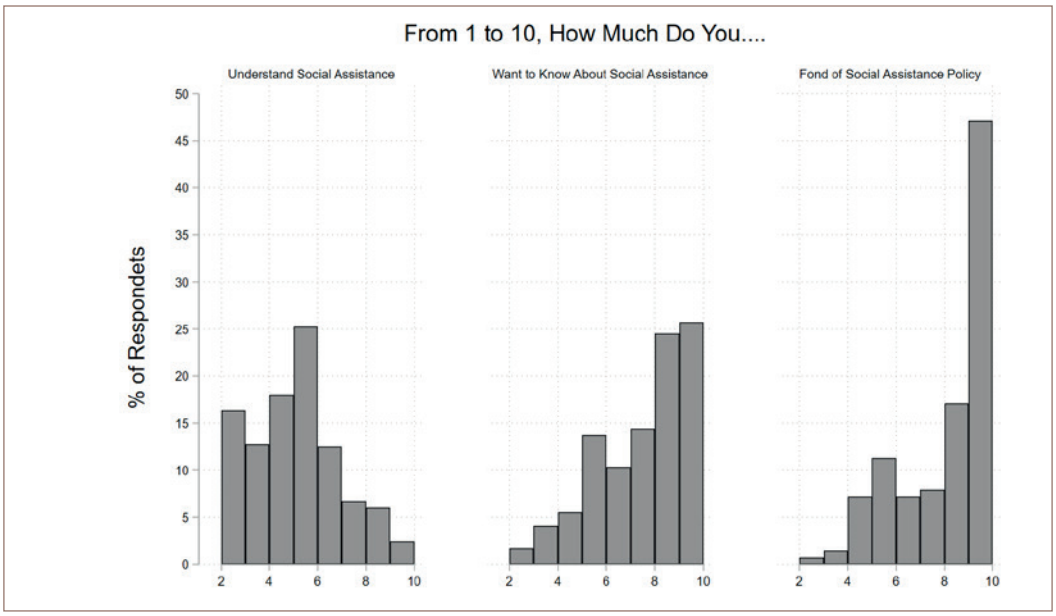
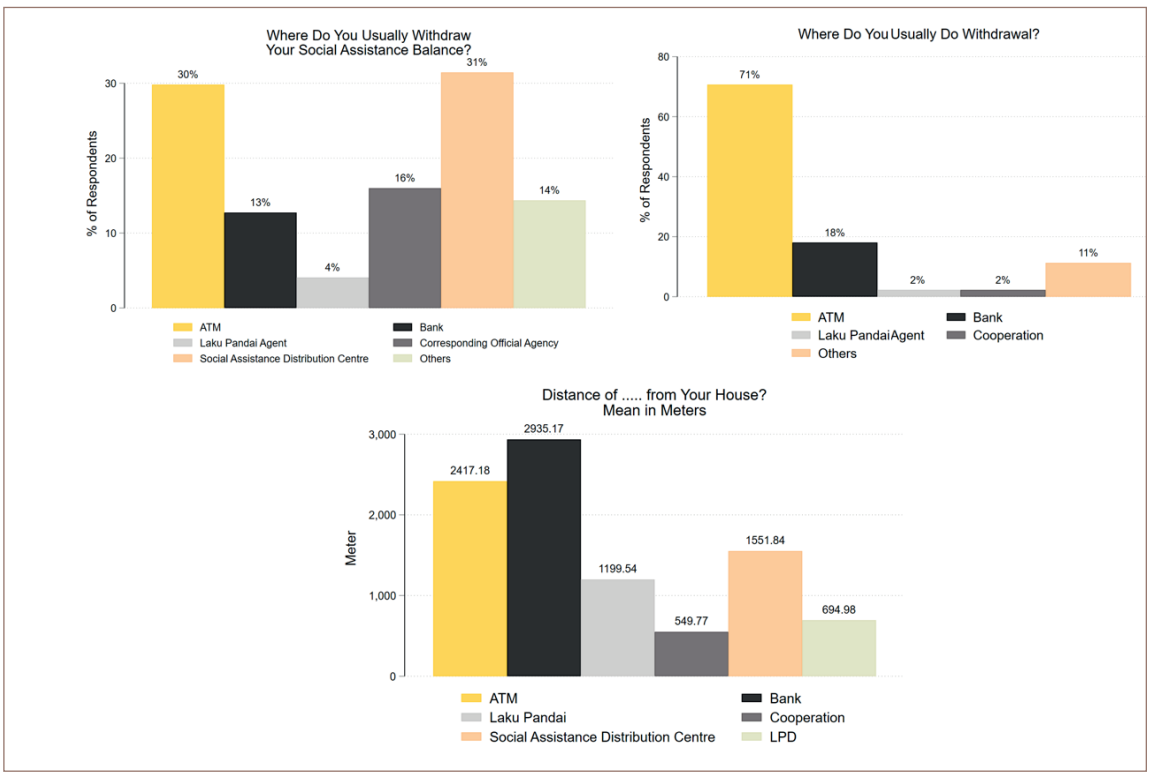


Figure 2: Samples' Valuation on Their Knowledge about, Willingness to Learn about, and Level of Fondness to Social Assistance Policy



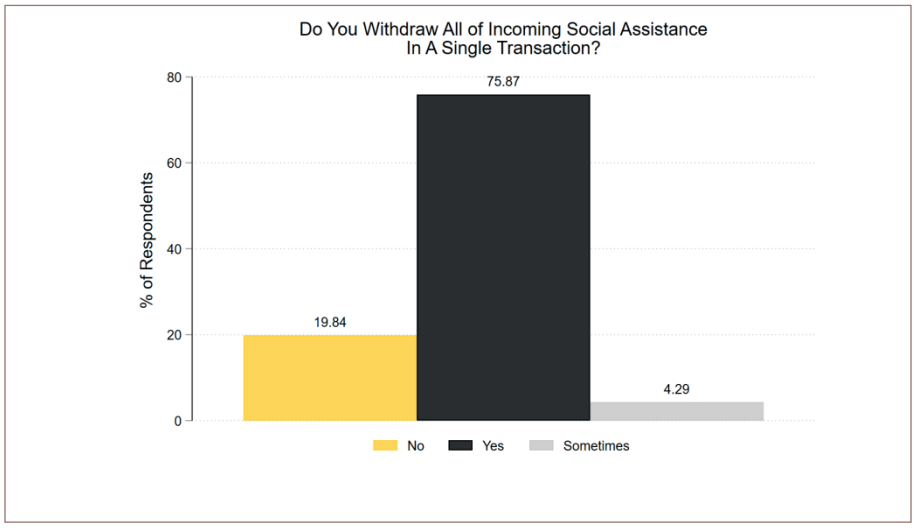
Source: LPEM Survey Data (2021).

Figure 3: Facility Used to Withdraw Cash & Its Distance from Respondents' Home



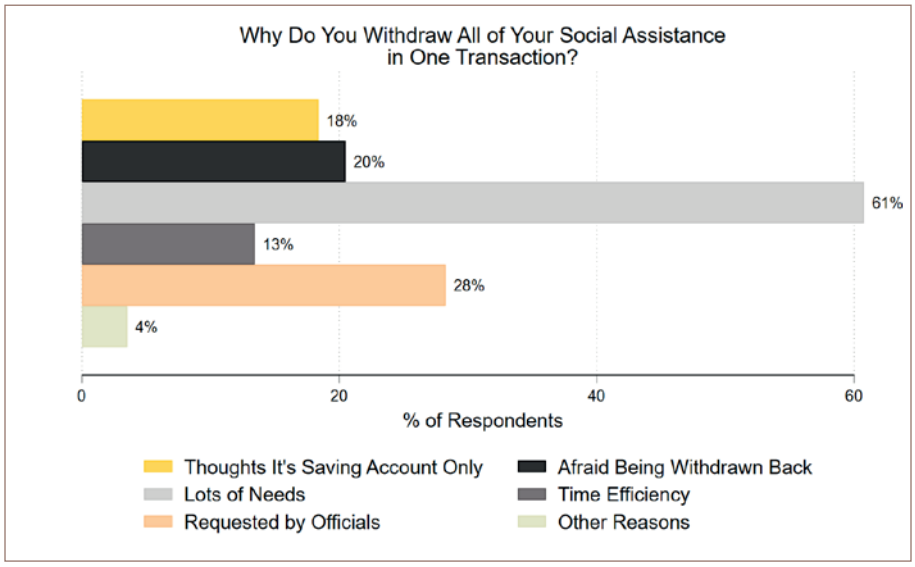
Source: LPEM Survey Data (2021).

Figure 4: Distribution of Samples by Their Behavior of Aid Withdrawal



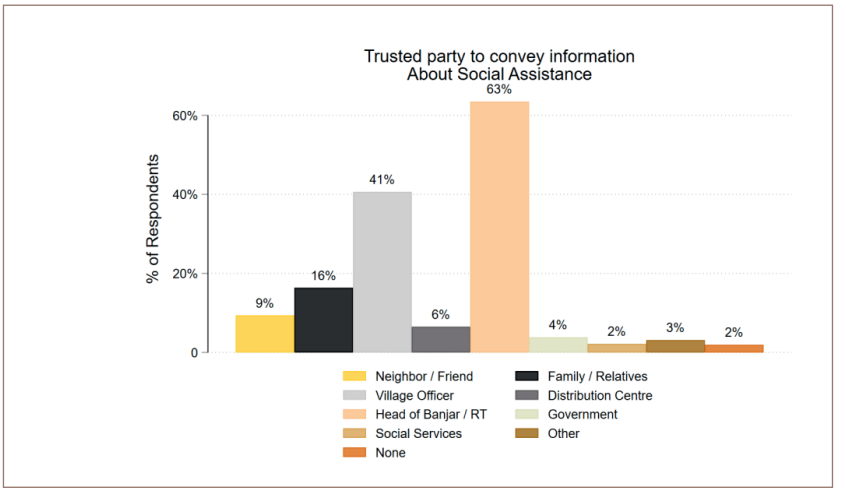
Source: LPEM Survey Data (2021).

Figure 5: Reasons Why Decided to Withdraw Social Assistance Amount in One Transaction



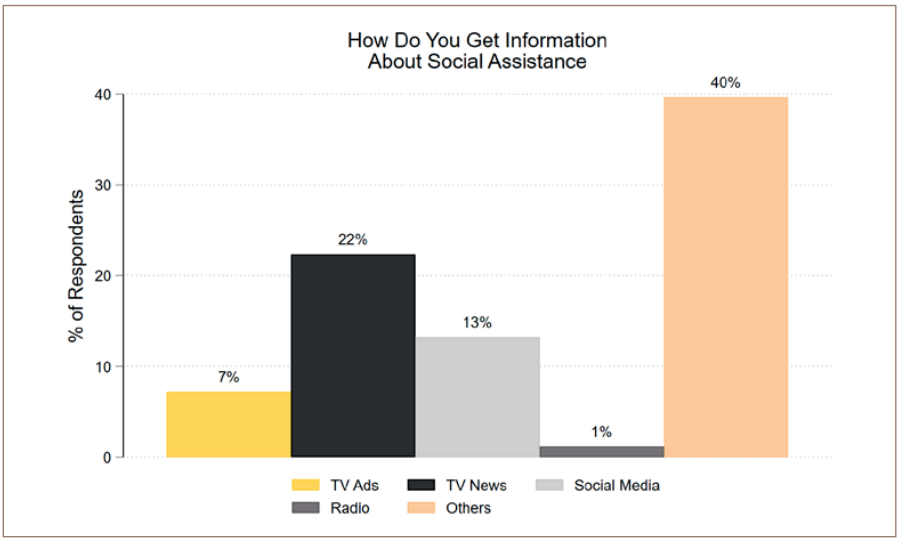
Source: LPEM Survey Data (2021).

Figure 6: Trusted Party to Convey Information about Social Assistance



Source: LPEM Survey Data (2021).

Figure 7: How Do You Get Information About Social Assistance



Source: LPEM Survey Data (2021).

Research Article

Post-Pandemic Digital Transformation: Opportunities and Challenges for South Asia and the World

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Syed Munir Khasru*

Abstract: The South Asian region has experienced rapid digitalisation across sectors, most prominently during the COVID-19 pandemic. Through digital transformation developing economies can gain new opportunities and insights, accelerate infrastructure development and spur industrial growth. Despite significant role of digital technology in increasing, complementing, or altering important services and areas of daily life, the digital divide in the Global South is stark and perhaps has increased. This article highlights the avenues for developed, poor, and underrepresented countries to benefit from digital transformation and its components for improving the quality of life. Investment in human capital, necessary infrastructure development and policies would help leverage digitalisation for development.

Digital Transformation: The Global Context

COVID-19 has led to a significant rise in the value of digital technology in enhancing, complementing, or shaping essential services and everyday lives such as healthcare, education, employment, and limited mobility. Despite the increasing acceptance of the utility and benefits of digital technology worldwide, the digital divide is blatantly evident and has considerably widened. The G20 needs to mobilise resources and insights to support the developing countries achieve a secured and socially inclusive digital transformation amidst these challenging times. In doing so, the G20 will substantially contribute towards capacitating developing nations to envisage and construct a full-fledged and rights-based digital ecosystem, garnering engagement of both public and civil society organizations.

Digital transformation is a progressive and beneficial strategy which can be applied for narrowing down the digital

*Chairman, The Institute for Policy, Advocacy, and Governance (IPAG), Dhaka, Bangaldesh with presence in New Delhi, Melbourne, Vienna and Dubai. email: munir.khasru@ipag.org

divide in the Global South. Apparently, there is considerable disparity in usage of digital technology between the underdeveloped and industrialised countries. The digital divide is a pressing matter impacting the livelihoods of developing countries whereas the privileges enjoyed by developed countries enable them to reap the benefits of cutting-edge technology by placing it in the forefront of socio-economic development. The debilitating culture-lag is posing barriers for poorer regions and small and medium enterprises across South Asia. Meanwhile regions such as Europe are utilising tools such as 3D Printing and Smart Robotics to enrich competency in operational technology. However, Europe is lagging in terms of market convergence and inclusion.

Poorly planned and underfunded infrastructure continues to hinder digital connectivity in the Global South. A minimum of four billion people is deprived of access to a steady internet connection with a meagre 35 per cent of the population from developing countries receiving access to the internet (The World Bank, n.d.). Though broadband connection is available in some of the less developed areas, the connection speed is quite slow. In fact, the download speed in countries with the slowest internet connection is 40 times slower than the download speed in countries with faster connections. Even when the accessibility and speed of the internet connection is ensured, disruptions in electricity obstruct the connections. For instance, only 16 per cent of rural households in India have access to power supply for one to eight hours per day with only 33 per cent having nine to twelve hours and 47 per cent having over 12 hours of access to power supply per day (Alexander and Padmanabhan, 2019). Additionally, affordability and willingness to pay tampers with the usage of internet. Lack of internet use is often associated with digital literacy (69 per cent), affordability (15 per cent) and relevance (12 per cent) (Kaka et al., 2021).

Innovation often fails to thrive in developing regions because there is an absence of an innovative, transparent, and accountable ecosystem. Discrepancies in the formulation and implementation of policies points toward inconsistency and incoherence. Furthermore, the process of setting up an ecosystem becomes tedious as a result of unnecessarily complex organizational practices and burdensome bureaucratic procedures. Highly competent workers reap more benefits from digital technologies in comparison to their less competent counterparts; thus further widening the digital divide. Digitisation seldom sustains in developing countries as non-affordability coupled with exorbitant costs is a non-negligible issue.

Digitisation is not confined to technological implementation but extends towards the inclusion of governments, institutions, MSMEs, entrepreneurs, doctors, students etc. Digital Transformation entails the holistic utilization of digital technology for effective communication, transference of knowledge, and business development among others. Therefore, digital transformation should function as a tool for social change, ensuring that no one is left behind through inclusive, sensitive, and insightful strategies backed by support of the G20.

There is still a significant gap in the use of digital technology between the industrialized and underdeveloped worlds. While industrialized economies are driving the majority of digital innovation, developing economies are lagging behind due to a variety of

difficulties. Even within developed areas, the gap between large and small businesses, as well as poorer and wealthier regions of the country, is expanding. While certain regions, such as Europe, excel at operational technology like as smart robotics and 3D printing, they fall behind in market inclusion and convergence.

For the developing economies, information technologies are rays of hope as they provide new opportunities for growth as well as new challenges. Adopting latest digitalisation tools and techniques could provide with an array of new opportunities in relation to improved efficiency and productivity, the creation of new jobs and services and better connectivity among agents. The level to which the developing nations are able to acquire these impending benefits is highly dependent on numerous social, economic and institutional magnitudes. Despite surging economic growth and heightened productivity expected from rapid digitisation, digital divides and interrelated forms of segregation and inequalities are commonly observed across countries in the region. This paper sheds light on pathways that will assist developed, underdeveloped, and underrepresented countries to positively exploit digital transformation and leverage its components for achieving a better quality of life.

Challenges of Digital Transformation in South Asia

The COVID-19 pandemic has compelled South Asia to step out of its comfort zone and take a leap toward digitalisation. These changes were the by-product of social-distancing measures followed by a virtual-education and work-from-home culture. Hence, South Asia witnessed an unprecedented spike in internet penetration, integrating smaller countries such as Nepal into the process. Nepal recorded an approximate 11 per cent boost in the use of broadband internet connections (Nepali Times, 2020). The National Digital Health Mission, an initiative by India is one of the outcomes of India embracing and accelerating digitisation in a post-COVID setting. The National Digital Health Mission features a unique health ID for every citizen in India, increasing the organizational efficiency of health-care service providers. As frequent lockdowns during the pandemic led to the closure of bricks-and-mortar businesses in South Asia, firms resorted to adopt e-commerce platforms supported by digital payment systems. For instance, in Bangladesh, there was a hike by 70-80 per cent in online sales in 2020, shoring up revenues by approximately $708.46 million (Hasan, 2020).

Despite boasting the world's second largest online market, South Asia is one of the world's poorest regions with a widening disparity of access and affordability in pursuit of digitisation. To comprehend the enormity of the situation, one need not venture further than India, Bangladesh, and Nepal, seeing that respectively 50 per cent, 59 per cent, and 65 per cent of the population do not have access to the internet. In the wake of digitization, with monetary, health, and education assistance schemes distributed online, a large fraction of South Asians were left behind. An estimate of 51 per cent of South Asian women were unable to access and benefit from social protection measures during the pandemic (UNICEF, n.d.). Children too were deprived from home schooling with 88 per cent requiring access to the internet. A disruption in education places children at imminent risk of first, dropping out of school, second, resorting to child labor,

and third, increasing the incidence of child marriage. These disruptions incur economic losses, potentially costing billions of dollars.

Many South Asian organisations have failed to incorporate e-commerce and other cloud-based technologies into their businesses. Hence, several businesses were unable to avert financial chaos and bore the brunt of dilemmas such as a 64 per cent decline in sales. Small enterprises, which were led by women fared the worst amidst the COVID-19 pandemic. As organisations begin to absorb and assimilate digitisation during the pandemic, the gaps in competent skills among the youth will continue to broaden, potentially leading to unemployment.

India has experienced technological advancements in recent years which are often highlighted in other parts of the world. However, despite significant rise in cell phone users, roughly 900 million, there are still huge gaps in access to internet especially the poorer sections of the society. With growing pace of digitalisation in certain segments of population and industries, the digital divide could widen unless enabling policies are in place.

Indian government has put in numerous efforts in promoting digitalisation for many years now. It comprises of efforts to make available majority of public services to all the citizens on the websites of ministries or government agencies or electronically and make the transactions transparent and smooth. In spite of the government's efforts towards increasing digital goods and services in the country, there is evidence of digital divide in the country, which is a reflection of the economic and social well-being of families.

Digital Infrastructure in South Asia

According to the World Bank, even a 10 per cent increase in broadband penetration in Low and Middle Income Countries (LMICs) results in a commensurate increase of 1.38 per cent in GDP (The World Bank, 2009). Digitisation, therefore, can play a crucial role in the recovery of economies. Such a hypothesis turned into reality as a growing number of people and businesses began transitioning towards a "work-from-home" model as the pandemic brought economies to a standstill. Digitization of existing processes became imperative to survival. As a result, investments towards the deployment of digital infrastructure, including cloud-based services, correspondingly accelerated to improve logistics and existing supply chains.

Yet, huge swathes of people across South Asia continue to lack a stable access to internet and digital services. According to the International Telecommunications Union (ITU), there has been a steady decline in the costs of internet connectivity over the years. Fixed broadband connection within the Asia-Pacific region (APAC) remains at 3 per cent of Gross National Income (GNI), higher than the 2 per cent target recommended by the Broadband Commission's affordability target (International Telecommunication Union, 2021). Promoting inclusiveness through commercial aggregation and structuring could help increase demand among investors. Likewise, sharing digital infrastructure such as towers and fibre cable could also help reduce overall capital expenditures, making connectivity more affordable to end-users, particularly in rural establishments.

Back in 2015, India was the only South Asian country to have IT-specific Memorandum of Understanding (MoUs) with over 25 countries, making the need for greater cooperation over best practices in e-governance and bridging digital divide even more critical. But as the number of people going online increases, so will investments in infrastructure. A recent report by Ernst and Young, for example, states that digital infrastructure in India would require investments of up to $23 billion by 2025 to support growing demands and increasing online traffic (Press Trust of India, 2022) with an estimated 330 million people using 5G even as the government aims to add as many as 800,000 new mobile towers by 2024 with three out of every four connected via optical fibre (PTI,2022).

It is, in addition, important to make such efforts sustainable. Data centres are heavy consumers of electricity with considerable base-loads that may require wider use of renewable sources of energy. Offsetting such industrial requirements through indigenous power generation sources could help flatten peak electricity usage patterns within such systems. 5G, the Internet of Things (IoT), Artificial Intelligence (AI), and cloud computing are expected to collectively generate a demand of 15 to 18 million square feet for data centers, all of which may fuel a rise in investments across Tier II and Tier III cities (Babar, 2021). While investments such as the Asian Infrastructure Investment Bank's (AIIB) $150 million to develop data centers for LMICs throughout the Asia-Pacific region is a welcome relief, leveraging the consumption potential of emerging digital technologies will demand cogent multilateral funding and institutional support (Asian Infrastructure Investment Bank , 2022).

However, expanding digital infrastructure will also require robust cyber security measures to ward off potential attacks and protect data against vulnerabilities. Global cyber security and digital privacy company Kaspersky estimated that India and Pakistan, among others, will remain among the top five targets for cyber attacks throughout the Asia Pacific Region. Despite the fact that India's cyber security industry nearly doubled in value from $4.3 billion in 2019 to $8.5 billion in 2021 with cyber security products growing from $740 million in 2019 to $1.37 billion in 2021, serious efforts towards building risk mitigation infrastructure, investing in research and development, and improving talent are needed (PTI, 2021). Bilateral and multilateral cooperation between governments with the involvement of the private sector will be key to building robust cyber security capabilities, similar to the visit of a Bangladesh delegation to the United States in November 2021 to discuss IT and cyber security cooperation.

Enabling digital transformation will also require the right personnel equipped with the necessary capacity to install and deploy technologies such as smart grids, tunneling systems, and rolling out fibre communication suited for transformative accessibility. Such a system would also require the presence of a strong telecommunications regulator to ensure policies governing infrastructure deployment remain sound, competitive, and conducive to innovation. India already remains on track to set up a National Fibre Authority along the lines of other industry regulators, while similar plans are afoot among its South Asian neighbours. Pakistan, for example, approved the Ministry of Information Technology and Telecommunications' (MoITT) plans for "Digital Pakistan" in

2019 that lays out a concrete vision and a conducive environment for technology startups and digital business models. As the pandemic forced digital technologies to take centre-stage, South Asia's service-driven economy would need to reform institutional and regulatory environments and encourage market-oriented training programmes to improve technical skills among industry professionals and an emerging workforce.

According to available data, 41 per cent of small and mid-cap companies in emerging markets currently lack access to sufficient finance. Bridging such a gap through appropriate, affordable, and accessible funding mechanisms will be key in deploying the next generation of communication technologies. Leveraging commercial bank debt for digital infrastructure for mid- to long-term periods could help lower costs, providing an interesting proposition for financiers. AIIB's announcement in November 2021 to invest $60 million in small and medium enterprises in digital and green energy infrastructure sector in emerging markets could probably address the estimated $5 trillion funding gap in emerging markets but requires wider private capital mobilisation to improve productivity and reduce the odds of falling behind a technological revolution (World Bank Group, 2020).

Doing so through institutional and stakeholder collaboration to enable the sharing of best practices, learning, and gleaning from the success stories of its counterparts across Southeast Asia such as Singapore and an ecosystem of enterprises would be instrumental in bolstering industrial growth and output. Southeast Asia's internet economy, for example, was on track to exceed $170 billion in 2021 and to double by 2025 to become one of the world's fastest growing digital markets, particularly in one key area – online transactions (Baijal et al., 2021). Indonesia, for example, plans to continue developing telecom under the Digital Indonesia Roadmap throughout 2022 with additional support through blended finance schemes.

Indonesia's digital economy is currently valued at $44 billion alone (Kramadibrata, 2021) – the highest in ASEAN – and is expected to rise eight fold by 2030 with venture capitalists (VCs) remaining bullish on the growth of e-commerce firms and the wider market. Strengths in developing digital infrastructure have enabled South Korea and Japan to promote cross-border trade, logistics, and e-commerce. Engaging in digital public goods (DPGs) and digital public infrastructures (DPIs) for an increasingly "online" population throughout South Asia would yield valuable lessons for emerging markets that can be replicated to similar levels of success; not as blueprints but as reference models for building customized and context-specific foundations with the Sustainable Development Goals (SDGs) in mind.

Summary & Recommendations

Several nations have fallen prey to the trap of applying "short-cuts" to attracting more tech firms whereas they should have simultaneously concentrated on developing the appropriate environment for tech-firms to flourish. For instance, due to its past engagement with socialism, restrictive business environment, and limited cross-border data flows, the tech-ecosystem in Tanzania has failed to garner investments from investors despite exhibiting growth. Developing countries need to assess and pinpoint their unique selling point by leveraging

valid and reliable data & attributes and utilize it to outline their individual value proposition. Case studies from United Arab Emirates and Singapore depict how the two countries have capitalised their unique strengths and utilised it to ensure development through innovation-oriented investment opportunities appealing for large organisations.

Roadmaps for digital transformation need to be intricate and considerate of all essential components such as the legal system, regulation of tax rates, simpler tax administration procedures, and access to energy and digital infrastructure which are reliable. Human capital and skill-enhancement should be guiding principle for sustaining vigorous and consistent digital transformation.

Developing economies may acquire new opportunities and insights through digital transformation which, in turn, would accelerate infrastructure development and spur industrial growth. In fact, digital transformation may be utilized as an impetus for change amidst the challenging times in a post-COVID backdrop. First, digital transformation enables countries to procure production possibilities across borders. Second, it enables MSMEs and both public and private companies in developing countries to improve the operational and business functions. Third, businesses can enrich and enhance their value creation process, and fourth, as digital transformation provides scope for robust cross-border communication, it would enable businesses in developing countries to align their operations as per global business standards.

However, to reap the benefits of and join the fourth industrial revolution, countries must proactively exercise transformative strategies which would accelerate digitization. Developing countries may utilise technology to generate valuable data that can be utilised as leverage whilst trading and bargaining with suppliers and purchasers from developed countries. However, core countries should engage and cooperate with periphery countries to bridge the culture lag by funding opportunities for development in climate action, SME financing, trade and investment through digital transformation. Of course, effort must be put forth jointly, and countries who want to assimilate the fourth industrial revolution into their economies must firstly, ensure localization through effective planning and budgetary provisions.

Policy makers must direct governments to invest in human capital to oversee successful implementation of a digital revolution. Thirdly, adequate data should be reviewed for sound decision-making and for reviewing institutional competence. Lastly, countries must assert on technology acquisition to leverage information and knowledge spill-overs, which is plausible through inflows of foreign direct investment, migration, academic exchange, use of open platforms, and the use of free software.

One of the most common recommendations for promoting innovation in developing economies is to increase financial support for research and development. Investing more in research and development while organizational practices remain corrupt or ineffective, however, has not produced the expected results in the past. As a result, it is critical to address foundational issues before developing economies can build an innovation ecosystem. This means that the country must create a strong digital transformation and innovation framework that is tailored to the country's resources, needs, and

goals. Economic opportunities, as well as education, health, community, service delivery, and social connections, should all be considered in this framework.

Policies must be supported by a prosperous environment, in which managerial and organizational practices encourage ecosystem development. This necessitates addressing issues such as information flow transparency, access to data for both commercial and public good purposes, the ability of researchers to work independently, encouraging collaboration, sharing and testing of ideas and solutions, public-private partnerships for the design of solutions that meet user needs, elimination of political interference, ensuring rule of law, and eliminating corruption, among others. In this context, it is also important to figure out which parts of the framework involving technological innovations should be made open to the public, i.e. open access.

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Research Article

Digitally Enhanced Infrastructures: A Three-Dimensional Approach

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Sachin Chaturvedi[1], Priyadarshi Dash[2], Andrey Filippov[3], Chinny C. Ogunro[4], Dimitris Psarrakis[5], Veronica Vecchi[6], Vladimir Yakunin[7]

Abstract: The collapse of supply chains and the dramatic shift in aggregate demand due to COVID-19 increased the significance of the strategic resilience of infrastructures as well as the importance of their being agile and flexible in order to address local-specific needs, especially during times of distress. Most importantly, it indicated that an infrastructure is not a remote enabler of economic activities but an integral part of the vital value chains of businesses and households, and thus immediately linked with the welfare of the citizens. Shifting the proximity of infrastructures closer to the value chain of businesses and households opens a window of opportunity to explore how digital technology tools can create significant improvements in the decision-making, financing and governance/agency efficiency of infrastructure projects. This paper identifies the challenges and opportunities of these three areas by introducing the concept of "digitally enhanced infrastructures", reflects on the promise and organisational challenges associated with these infrastructures, briefly explores the ways in which they can neutralise the acute policy effects of the dichotomy between developed and developing regions, and provides practical recommendations to improve the existing infrastructures regime.

Introduction

A general observation is that operating units with an existing digital layer in their value chains and business models were more efficient in absorbing the supply chain and demand shocks of the COVID-19 distress. The subsequent acceleration of digitally enabled operational solutions not only imposes a significant challenge in the operation of existing infrastructures (usually identified as the need to add a digital layer to existing "bricks and mortar" facilities), it also opens a wide window of opportunity in: (1) improving decision-making processes around the location, size, tailor-made idiosyncratic characteristics and usage of infrastructures, by

[1] Director General, Research and Information System for Developing Countries (RIS);
[2] Associate Professor, Research and Information System for Developing Countries (RIS);
[3] International Development Director, CENTERO ;
[4] Chief Executive Officer at WellSpring Health;
[5] Economic & Monetary Policy Advisor, European Parliament;
[6] Associate Professor of Practice of Government, Health and Not for Profit at SDA Bocconi School of Management and
[7] Head of the State Policy Department, Faculty of Political Science, Lomonosov Moscow State University.
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leveraging data pooling and analytics capabilities, (2) lifting financial frictions in the aggregation and allocation of capital using investment platforms, crowd-funding platforms and FinTech enabling solutions and (3) improving the efficiency of governance structures including contracting, monitoring and coordination/agency mechanisms. The challenge can be addressed in the three lines of engagement outlined above by following a "technology neutral" approach but it is by no means "governance neutral". Requirements of privacy, social inclusion, accountability and transparency require optimal organisational structures with checks and balances that blend the potential of both public-sector and private stakeholders.

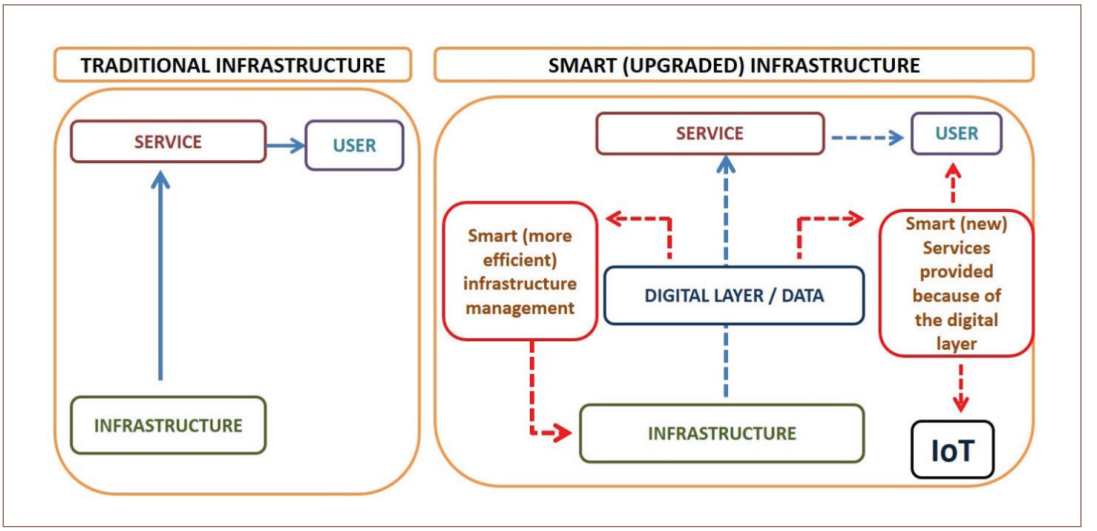
The Big Picture

The impact of the COVID-19 pandemic on usage patterns of various types of infrastructure, as well as the accelerating adoption of digital technologies across industries, challenged established perceptions of the proximity of infrastructures to the value chains of industries, businesses, and households. This *topological shift* compels us to reassess the value of infrastructures in the economy from mere "enablers" and "facilitators" that exist somewhere "out there" to an organic element that affects economic efficiency at an arm's-length distance. Infrastructures are no longer just "bricks and mortar" projects. First, they are *living organisations* that merge with our day-to-day operations in an interactive manner that disrupts their legacy value proposition. Second, the value of an infrastructure does not derive merely from its efficiency in isolation, but from its *blending* with other infrastructures in the value chain and in the development process, including *inter alia* supply chains and the healthcare, financial and educational systems. In a new situation, the infrastructure transforms into a platform on which existing services are digitally updated and new ones are created. This enables a wide range of network effects to drive new business models and platform strategies for creating and distributing value (OECD, 2018).

It is believed that the infrastructures of Industry 4.0 should reflect the nature of the economic and social challenges of Industry 4.0, as well as expectations of it. What distinguishes the infrastructures of the current industrial era from the previous one is the transition from a mentality that infrastructures reflect massive needs that are more or less homogeneous to a mentality of customisation. The concept of customisation is not limited to the logic of glocalisation of best practices but also reflects new opportunities created by information technologies to identify the needs of users on the personal or small community level. From a political economy point of view, digital technologies provide an excellent opportunity to refocus on tailor-made solutions that advance the role of *communities* as the end-users of infrastructure networks (United Nations, 2019).

The digital layer approach that we propose for G20 is instrumental, not merely in improving the services that existing physical and social infrastructures provide, but also in augmenting their linkages with other infrastructure systems in dense and smart networks. Elements of data analytics, data storage, enhanced connectivity, augmented reality, machine learning, hyper-performance computing and distributed ledgers transform the *infrastructure stack* by enabling the digital layer to improve the coordination and

Figure 1: The Idea of Smart/Exponential Infrastructure



Source: Drawn by Authors.

density of supply and value chains. This reduces networking costs, transaction costs, replication costs, transportation costs, tracking costs and verification costs. It is worth noting that taking transaction-related costs as the basis of infrastructure analysis means that we do not need significantly different economic models compared to previous industrial eras – we need only a wider approach.

Building "the Infrastructure" for Smart Infrastructures

Though the economic logic is not sharply different, the transition from Industry 3.0 to Industry 4.0 infrastructures requires a new enabling basis that will streamline the process from inception to implementation. Institutional certainty (endorsement by stakeholders) and legal certainty (endorsement by the regulatory environment) are *sine qua non* requirements. They are necessary conditions for a frictionless transition to the new paradigm of infrastructure development, but, we believe, they are by no means sufficient. We need *a new infrastructure for infrastructures*.

Infrastructures of the previous industrial eras reflected, from a methodological point of view, an understanding that value chains were comparatively stable, just like the economic equilibria. The winner was determined by achieving the appropriate economies of scope and scale. Because the moving averages were slow, the value fluctuation of infrastructures was relatively inactive (accounting depreciation rules aside). The challenge was to identify the project with the greatest impact (often determined in terms of actual size) and to identify the appropriate financial structure to fund its implementation. Moving averages now shift exponentially rather than linearly. Agility is more important than size, transient strategic advantage is a more appropriate business target than the creation of stable competitive advantage, and NPV (Net Present Value) and IRR (Internal Rate of Return) calculations of financial value provide unreliable metrics, thus real options valuation methods are preferred. In this environment, even the selection of a project in the first

place is a challenging task. This helps to explain why, in areas where there is an abundance of capital and a real need for infrastructure projects, the demand side is very thin.

In an environment like this, the selection of an agile, future-proof, strategy-relevant, value-enhancing, community-reinforcing, network-oriented infrastructure project requires a different decision-making mechanism and a technologically relevant information, governance and financing infrastructure in place to support this mechanism all the way on. We suggest three major facilitating improvements:

Data Infrastructures that will Inform the Decision-making Process

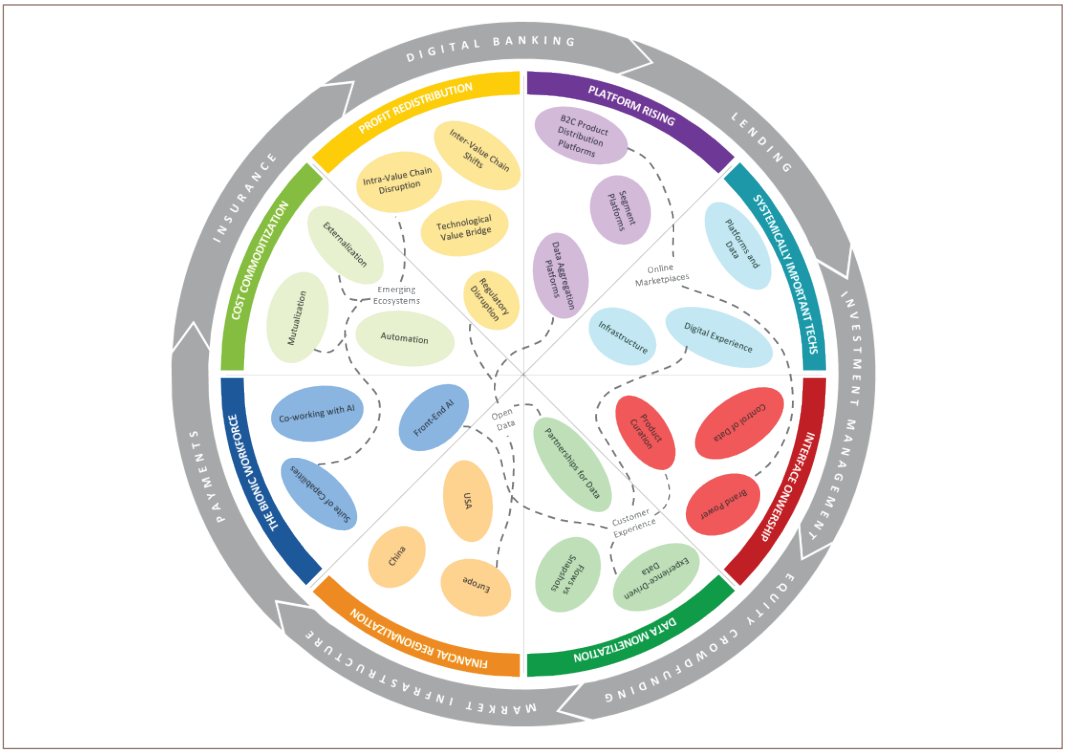
Data analytics emerges as a crucial component for decision making. The abundance of data generation allows us to improve the precision of economic planning at a level of granularity that is unprecedented. Predictive and, most importantly, prescriptive analytics can inform the path of infrastructure decision makers, reduce uncertainty, increase the predictability of future cash flows and spot shifts in usage in real time. Most importantly, they can determine (1) the magnitude of the infrastructure needed in a region, (2) the auxiliary infrastructures in the grid and (3) the specificities required to maximise the value of the project for the local communities, taking into consideration the idiosyncratic characteristics of the regional environments. The authors believe that uncertainty management along with *idiosyncratic specifications recognition* is a crucial first step for any future infrastructure project undertaking. Similarly, data pooling and analytics is a critical facilitator for the acceleration of vital infrastructure in both developed and developing regions.

Data management, however, itself requires a trusted infrastructure. Cloud computing, along with more localised solutions like edge computing, is a necessary infrastructure for the collection of infrastructure data. It is important, though, to make sure that these data concentrations are considered as data for the public good. This leads us to state a preference for dedicated organisational entities comprising both public- and private-sector stakeholders that will be accountable for the integrity, security, use and re-use of data in a way that respects the privacy of the data generators and ensures the inclusion and sustainability of the communities. The data pooling, as well as their use, will be part of the value chain of infrastructure project building, running and aiming for constant improvements both of the operational efficiency of the projects and the maximisation of the end-user experience. Other types of risks will be identified and managed as part of an integrated approach to data management (such as strategic, operational, compliance, cyber). These data will not be used for monetisation by anybody without the consent of the generators.

Crowd-funding and Investment Platforms for Infrastructure Project Acceleration

As mentioned earlier, financial metrics in a rapidly changing financial environment and value chains require dynamic rather than static methods of valuation. This can be achieved with real options valuation methods and financial instruments for capital accumulation and risk sharing that improve liquidity, accelerate accumulation of capital and improve the

Figure 2: Beyond FinTech: A Pragmatic Assessment of Disruptive Potential in Financial Services



Source: World Economic Forum (2017)

agility in the capital structure balance of equity and debt. Digital finance solutions can play an instrumental role in this direction. The tokenisation of value, the simplicity of issuing and trading infrastructure securities (both equity-like and bond-like) and RegTech solutions that can allow the supervisory authorities to monitor the transactions through *embedded supervision mechanisms* open up new horizons of opportunities (Solms, 2020; Chenqi Mou, 2021).

Crowd-funding platforms are expected to play a significant role in a FinTech-empowered era of financial intermediation that infrastructure developers and local communities cannot ignore. Aggregation of capital for specific projects, even in the most remote and disadvantaged areas, can be easily designed and implemented by crowd-funding platforms (Oneplanetcrowd, Convergence Finance, Citizenergy, etc.), reaching audiences and pools of capital available for development infrastructures (Nika Pranata, 2020). This neutralises the impediment facing certain communities to generate crowd-funding if they lack the necessary crowd. Despite the wider perception that FinTech and blockchain-based finance will bring us to an era of financial disintermediation, we believe that recent technological developments will instead create a new era of financial intermediation, much more favourable for strategic and infrastructure projects. Mainstreaming unbanked populations into the formal banking sector and enabling cost-effective access to essential financial services using mobile banking

platforms in developing countries are both commendable. We also believe that FinTech tools will improve the operational efficiency of development banks as well as the coordination of these banks with other financial intermediaries and stakeholders (PwC, 2016).

Investment platforms are another strategic tool that strategic project developers and local communities can leverage in creating robust infrastructure networks. One of the major impediments to the demand side, both in developing and developed regions, was that many projects, despite their major economic and social significance, fell below the investment thresholds of many development and reconstruction banks. The EU, in its EFSI and InvestEU Programmes, has developed the investment platforms instrument to solve the problem of low thresholds by aggregating two or more regional or thematic smaller infrastructure projects under one "umbrella" (Maria João Ribeirinho, 2020). This allowed streamlining, simplification and cost efficiency for project initiation. We believe that the design of special purpose vehicles like investment platforms along with crowd-funding and FinTech tools can create a new era of agile public-private partnerships (PPPs) much more relevant to the requirements of the infrastructures of Industry 4.0 and a significant facilitator for cross-border projects, as this scheme bypasses significant impediments in current design and implementation practices. Moreover, financing smart digital infrastructure through smarter ways of local resource mobilisation could also unleash new sources of funding and enhance marketability of innovative financing instruments. This includes novel ways of revenue generation such as the idea of the Non-Fare Revenue Box of urban metro rail systems (e.g., the Delhi Metro), which typically include commercial use of land in the station and converting railway stations as multi-purpose activity centres including shopping malls. Likewise, by adopting the land value capture (LVC) method, underdeveloped (or under-used) land around urban infrastructure such as roads, bridges and highways can be leveraged for additional resource generation. Municipal bonds, often packaged as social impact bonds and/or blended finance products, can be effectively integrated into local digital layer creation. The presence of a digital model of the infrastructure complex (such as digital twins) can improve the effectiveness and prevalence of using the LVC method.

Again, similarly to the case of data infrastructures mentioned above, a major issue to be resolved is the governance and ownership structure of these platforms. In the case of investment platforms, the governance and accountability setting is straightforward as it replicates traditional synergetic functions. But in the case of crowd-funding platforms a regulatory environment that ensures investor protection, capital channelling processes and anti-money laundering requirements is of paramount importance, especially due to the cross-border nature of these platforms (Gasparro, 2015). The authors believe that infrastructure-dedicated crowd-funding platforms are necessary to augment the financing operations of development banks, commercial banks, qualified private investors and also private individuals who want to fund a project that inspires them in the regions they care about most.

Coordination and Agency Mechanisms for Infrastructures

The leveraging of data-empowered decision-making instruments and innovative financing tools requires also a technologically relevant approach in the facilitation of coordination between the stakeholders as well as the reduction of the possibility of market failures due to agency problems. Digital tools enable the removal of inefficiencies occurring in contracting, monitoring and verification costs and incentives alignment. We find that an innovative approach in accelerating the development of enhanced infrastructure projects requires us to reconsider legacy models of PPPs.

One of our major beliefs is that, while we realise the disruptive force of the enhanced infrastructures, we do not believe that a fundamentally new economics is needed to address the challenge. We only need to think, "What is new?" As new financing tools can improve the channelling of capital and the capital structures, so can digitally enhanced agency and contracting models – such as PPPs that employ smart contracts, Ricardian contracts and oracle technological solutions – improve transparency, integrity and efficiency through the automation of verification procedures and reduction of monitoring and tracking costs (Savian, 2020). This requires an enabling regulatory framework that will encourage innovative design of PPPs in the spirit of "technological neutrality" that is already employed in other areas of economic activity (ElGohary, 2020).

Robust Economics for Smart Infrastructures

Our approach to digitally enhanced infrastructures brings us into an emerging field of infrastructure economics where the main question is how exponential technologies can transform the major models of supply, demand, financing and coordination/agency of infrastructure projects and affect decision making, preferences and incentives in the interaction of communities, investors and governments (McKinsey, 2018).

By shifting the interest of architectural design of infrastructures from a model – and mindset – that advances the significance of location (centralisation approach) to a model that advances the significance of the network and the proximity of the infrastructure to the value chain of industries, firms and households (decentralisation approach), we bypass longstanding obstacles to infrastructure project implementation, such as: (1) the problem of boosting effective demand, (2) the problem of mobilising adequate funding, (3) the problem of linking cross-border projects, (4) the problem of achieving transparent coordination – and (5) most importantly, we make significant steps in neutralising the dichotomy of infrastructure building in developing and developed economies or regions.

The last point is critical. Our team comprises a diverse group of people from Africa, Asia and Europe, and a major challenge we spotted from the beginning was the extent to which the approach of digitally enhanced infrastructures neutralises the effects of the persistent dichotomy between developed and developing countries/ regions in developing and enhancing access to infrastructure services, and makes infrastructure an opportunity for convergence of technological standards, regulations, engineering manuals and ex-post engagement procedures that ensure compatibility, interoperability and seamless interlinking of supply and

value chains. These issues, alongside the homogenisation of financing operations, PPP design and data management procedures, are strategic in shifting the supply curve.

However, supply-side instruments are not enough in reaching a desirable equilibrium. Demand-side instruments are equally important. There are two challenges associated with the demand side. First is the requirement for remote communities to have a clear understanding of the technological options of new types of infrastructures. Demand for digitally enhanced infrastructures requires operational understanding of the new value proposition and digital literacy that can be locally developed through a coordination of business, government and educational institutions. Second, we face the challenge of accelerating the transition from *notional* to *effective* demand. Wherever we have a strong understanding of the need for enhanced infrastructures, we do not have adequate willingness to pay for them. The solution to this problem can be a coordinated action that blends innovative financing instruments, as described above, with clear strategies that prioritise the development of enhanced infrastructures as short/mid-term targets rather than long-term plans.

Way Forward

Following our analysis, we advocate the formation of a dedicated interdisciplinary team within the G20, with support from multilateral development institutions (GIH, World Bank, OECD, etc.) to coordinate efforts and reflect a digital dimension in the Quality Infrastructure Investment framework. We propose the following policy recommendation as concrete and immediate step to capitalise on the technological opportunities provided by digital instruments as well as the momentum generated by the pandemic:

The design of a governance framework that will enable and accelerate the implementation of organisational entities comprising accountable public and private stakeholders for the development of data pooling and data analytics infrastructures that will improve the decision-making process in infrastructure development from the inception to implementation.

The articulation of governance, ownership, operational and regulatory requirements for the creation and management of crowd-funding and investment platforms, leveraging FinTech and RegTech instruments, as well as their blending with existing development banks and other financial intermediaries to support the capital aggregation procedure for infrastructure projects irrespective of their location and size.

The adoption of an approach of "technological neutrality" is needed in the design of coordination and agency mechanisms among infrastructure stakeholders in an attempt to leverage the upscale of digital technology instruments in improving the operational and cost efficiency of trusted governance, contracting, monitoring and verification mechanisms.

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Research Article

Availing Existing Frameworks to Enable a Clean and Sustainable Transition in the Transport Sector

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Jitendra Roychoudhury[1], Puneet Kamboj[2], Saumitra Saxena[3], Anurag Pal Sehgal[4]

Abstract: While there is an immediate need to tackle global environmental issues, the decarbonisation of the transport sector represents a key challenge at the policy level and in particular the financial and environmental sustainability of this process. This is of critical importance not just for the G20 but the non-G20 world also. Decarbonisation poses a significant challenge as countries and organisations try to manage the energy transition to cleaner fuels. Therefore, it is essential to take lessons from policies and institutions that are offering support for the energy transition in other sectors. For example, the G20 Transport Task Group should help develop policy mechanisms such as the circular carbon economy to foster a painless transition to zero-carbon fuels. Globally, several organisations regulate shipping without an overarching statutory organisation or body having the expertise and financial strength to manage emerging risks (financial, operational, policy and regulatory) that will result from the transition to zero-carbon fuels.

Introduction

The decarbonisation of the transport sector has been a critical priority for policymakers globally due to its significant contribution to Greenhouse Gases (GHG) emissions. Globally the transport sector emits around 24 per cent of the total energy-related CO2 emissions (Pangestu 2021). Emissions from vehicles cause urban air quality to deteriorate. This deterioration negatively impacts on the goals under Sustainable Development Goals (SDG)-11, to "make cities inclusive, safe, resilient and sustainable", on sustainable cities and communities and delays the fulfilment of climate action goals under SDG-13, "take urgent action to combat climate change and its impacts". A more sustainable mechanism needs to be incorporated. The challenge is to execute the transition while ensuring that transport sectors' decarbonization does not create efficiency and innovation islands in some countries but is more

[1] Fellow, King Abdullah Petroleum Studies and Research Center, Riyadh

[2] Program Associate, Council on Energy, Environment, and Water, New Delhi

[3] Research Scientist, King Abdullah University of Science and Technology, Thuwal

[4] Principal, Noble Group, Singapore

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broad-based globally in line with SDG-17, "strengthen the means of implementation and revitalize the global partnership for sustainable development".

With technology evolving to enable energy transition, there is an urgent need to explore ways to make marine fuels compatible with the SDG targets and frameworks. Supporting this transition would facilitate business innovation and leadership in this space, which is of critical importance not just for the G20 but also equally important in the post-COVID era of supply chain diversifications for the non-G20 world.

Against this backdrop, this paper highlights two critical areas of transportation sector e.g. circular carbon economy and synthetic/e-fuel in shipping industry towards a clean and sustainable transition. It also envisages a roadmap for implementing various policy measures aims at this transition.

Circular Carbon Economy

Policy measures are required to build on the idea of the 4Rs of the circular carbon economy (CCE) – reduce, reuse, recycle and remove – for the efficient management of carbon emissions from heavy-duty vehicles (HDVs). HDVs account for 40 per cent of CO2 emissions from transport and a smaller but fast-growing share in the vehicle fleet (ICCT, 2018). The increasing number of HDVs in the global vehicle parc leads to increasing oil consumption and hence associated CO2 emissions. Shifting HDVs' reliance on oil to other, non-CO2, fuels is difficult due to the vehicles' high energy and power density requirement and the lack of alternative technological options (IEA, 2020a). The dual challenge of meeting the growing energy demand and simultaneously reducing CO2 emissions from HDVs requires a combination of innovative technologies and policy mechanisms such as the circular carbon economy (CCE). The 4Rs of a CCE – reduce, reuse, recycle and remove – offer a holistic approach to carbon management, which is necessary to reverse negative climate change impacts (KAPSARC, 2020). Transport decarbonisation in road transport and specifically in HDVs can be achieved through a CCE, which offers a strategic and systematic approach to managing carbon emissions.

Reduce: The first R of the CCE reduces carbon emissions by using innovative technologies such as electric or hydrogen-based power trains, improving the fuel efficiency of internal combustion engines, stringent tailpipe emission standards, improving net loading capacities, and in-time vehicle retirement of existing inefficient fleets. These strategies are at the core of the CCE.

Reuse: The second R of the CCE creates economic value by capturing carbon and utilizing it. A great example of this is e-fuels which require CO2 for production and can be used in internal combustion engines.

Recycle: The third R of the CCE utilizes atmospheric CO2 to grow biomass, which can be harvested for bioenergy, such as biofuels. Biofuels can play a significant role as an alternative fuel for HDVs in the transport sector.

Remove: The fourth and final R of CCE captures the carbon released in the atmosphere and either removes or reuses it. On-board carbon capture (where the carbon emissions from the vehicle are trapped at the point of emission) is currently being explored to capture carbon while being used in internal combustion engines (Shivom and Maréchal, 2019). Secondly, as the developed world proceeds towards decarbonization and alternative fuels, it will discard its older

vehicle fleets. These HDVs usually end up in used vehicle markets in developing countries. This export of used vehicles to the developing countries needs to be curtailed using policies and incentives and the vehicles themselves should be scrapped in the land of origin. Exports of these used HDVs to developing nations, tend to, in a perverse form, export the problem to other countries, which often do not have either the policy structure or the fuel quality to manage emissions from such vehicles. Lack of maintenance of such vehicles is another issue.

The G20 Transport Task Group (G20 TTG) can take the lead in coordinating the measures required to accelerate the implementation of the 4Rs of CCE in HDVs across G20 nations. Reducing emissions from HDVs is also one of the main objectives of the G20 TTG. According to the IEA report on trucks and buses, only six G20 members (China, the United States, the European Union, India, Japan and Canada) sold new HDVs with approved fuel efficiency standards in 2019 (IEA, 2020b). For the rest of the G20 members (excluding the six mentioned above), either there are no standards or standards are in the process of development. The G20 TTG can guide and share best practices among G20 members to promote fuel efficiency standards. Moreover, having stringent tailpipe emissions standards would reduce carbon and help improve the local air quality, which is becoming a significant threat to public health in countries like India and China with very high urban population density.

Biofuels can play an essential role in decarbonizing HDVs, supporting developing technologies such as electric and/or hydrogen vehicles for the long-term decarbonization of HDV fleets. In addition, biofuels can be directly used in internal combustion engines without significant upgrades. However, the market price is the biggest barrier to the large-scale adoption of biofuels. Therefore, the G20 nations should assess land availability and the associated social risks to utilise the full potential of sustainable biofuels, from either sustainable agriculture or even waste-based biofuels in their energy mix and introduce dedicated policies and innovative financing options to bring down the cost and increase the share of biofuels in their energy mix. The ongoing COVID-19 pandemic has pushed the world into an economic crisis, and many countries are preparing economic stimulus packages to get their economies back on track. This adjustment offers countries an opportunity to rethink and readjust their pathways for future development. The G20 governments can allocate a part of their stimulus package to invest in technologies like e-fuels and on-board or mobile carbon capture.

The G20 nations should also work on retiring and scrapping inefficient vehicles in the countries of origin; if they fail to do so most of these inefficient vehicles will be exported and sold in the used vehicle market in emerging economies. Such used vehicles are often already paid for as a result of usage and depreciation for the countries of origin. Exporting these used vehicles to emerging economies incentivises the creation of secondary or, in some cases, tertiary used-vehicle markets, where the buyers in such markets focus primarily on the low upfront cost of the vehicle and any fuel efficiency considerations are seldom considered. In addition, G20 nations should use their overseas development aid mechanisms to help support transport infrastructure development, build policy-making capacity, and establish fuel standards and quality fuel supply

systems to prevent emissions leakage. As the developed world starts to move towards decarbonizing its transport sector, there will be massive pressure to discard inefficient vehicles by exporting them to the least developed countries. However, this should not be practised, and policy measures in this regard from the G20 will help immeasurably to reduce used vehicle exports.

Synthetic/E-Fuels in Shipping Industry

Policy measures are required to finance and build the infrastructure necessary to adopt hydrogen and synthetic/e-fuels for the global shipping industry. According to the World Economic Forum's E15 Initiative, effective global trade is "crucial for reinvigorating economic growth and confronting 21st-century global challenges" (World Economic Forum, 2016, 7). Around 90 per cent of world trade is carried by ships (Wang, 2014). However, shipping also creates colossal pollution through its hazardous emissions. SOX emissions from ships have been recognised as a significant threat to the global environment, highly destabilizing extremely vulnerable ecosystems such as the polar region near the Arctic Sea, leading to the International Maritime Organization's IMO2020 mandate of a sulphur cap on marine fuels. To align itself to Paris climate goals, the IMO has outlined its 2050 vision to reduce CO2emissions by 50 per cent by 2050 (from base levels in 2008) (IMO 2020 n.d.). Maritime transport, accounting for 2.5 per cent of global GHG emissions (Englert and Losos, 2021), is a challenging sector in terms of transition to lower emissions intensity because of the currently insufficient technological feasibility of mass electrification of this mode of transport. Hence, reducing emissions from shipping in the future and enabling a lower carbon footprint of this sector requires a careful selection from the available fuel options.

Synthetic fuels offer a promising alternative for low carbon and less air pollutants emissions from long-haul shipping. Synthetic fuels (or electro-fuels) can be made from the chemical conversion of carbon dioxide (captured) and hydrogen (from the electrolysis of water utilizing green electricity) into fuels such as e-methane, e-methanol, dimethyl ether (DME), e-petrol, e-kerosene and e-diesel. The technology of e-fuels (e.g. Fischer Tropsch or methanol synthesis) is well established and commercially matured. These fuels are sulphur and heavy metal-free and can be designed to reduce black carbon reductions. The volumetric and energy density is comparable to existing marine fuels like HFO and distillates (e.g. diesel, MGO, MDO) and can be readily used as "drop-in" replacements or blends. The bunkering infrastructure and architecture of marine propulsion engines may need slight modifications to enable the large-scale deployment of synthetic fuels. However, the scale at which an e-marine fuel needs to be produced for the defossilisation of marine fuels makes this plausibly a distant scenario.

Apart from synthetic fuels, liquefied hydrogen and ammonia can also be part of a defossilized fuel mix for the shipping industry. The World Bank's study on decarbonizing the shipping industry highlights (green) ammonia and (green) hydrogen as possible front runners for zero-carbon bunker fuels in the future with green ammonia edges out hydrogen due to better handling capabilities and ready acceptability by mariners (Englert and Losos, 2021). The manufacturing of synthetic fuels can

benefit from the co-location of renewable electricity to produce clean hydrogen/ methane and a source of captured carbon dioxide. Hence a green hydrogen/green ammonia production hub near major bunkering facilities is the desirable proposition.

Even though emissions because of shipping (percentage of total GHG emission) are not huge, it has grown faster than other GHG contributors (along with aviation). The bulk of the marine shipping industry is commodity transport with regional bunkering hotspots across the world. Five key bunkering locations contribute to about 60 per cent of all bunker sales in the world – Singapore, Fujairah (UAE), Rotterdam (Netherlands), Hong Kong (China) and Antwerp (Netherlands) (Ban et al., 2015). This unique feature of the industry and the structural changes to existing supply chains in a post-COVID-19 world can foster the early adoption of environment-friendly fuel sources. HFO (79 per cent share of bunker fuel (Englert and Losos, 2021)), distillates, and LNG (21 per cent share of bunker fuel (Englert and Losos, 2021)) can be progressively replaced by e-methanol, e-methane, e-diesel, liquid hydrogen, or ammonia in a judicious energy mix best settled by economics and geopolitical factors. However, the challenge lies in enabling innovative policy support with financial incentives (in addition to technological innovation) to support the transition and preventing costly technology choices that can increase the risk of stranded assets, given long project timelines and heavy capital investments.

A recent World Bank study (Englert and Losos, 2021) stated that about US$1 trillion in future investments was needed to transition to zero-carbon fuels by 2050 (the IMO target alone, while total decarbonization could be double that amount). Even as the IMO continues to lead the global mandate to transition the global maritime industry to zero-carbon fuels, an international level strategy with an actual outlay for public investment would help the industry align its long-term investment plans to facilitate a smooth transition. Support from the relevant governments could be in the form of an infrastructure investment tax holiday (87 per cent of investment is expected to be for inland infrastructure like storage tanks, fuel loading and support equipment, while only 13 per cent is on ships) or priority rates for infrastructure investment or viability gap funding, targeting one of the proposed zero-carbon fuels especially by the top five existing bunkering hotspots (outlined earlier). However, the presence of an entrenched bunkering ecosystem may prevent the switch to a newer ecosystem in these countries. Developing countries may take advantage of resetting global supply chains to attract investment in new bunkering infrastructure development. Zero-carbon fuels with lower energy density would entail more frequent refuelling; hence the need to develop new port/bunkering infrastructure is not a farfetched idea.

Another factor that could potentially support the transition faster is a global carbon price, suitable for reducing carbon emissions from other sectors, and G20 can facilitate setting up mechanisms for global price discovery markets and trade in carbon. A carbon pricing would incentivize the high emitters in the shipping industry to incorporate zero-carbon fuels faster and invest in fleet changes that are compatible with zero-carbon fuels, thereby creating a demand

which would accelerate the supply infrastructure.

The World Bank has launched the Global Facility to Decarbonize Transport (GFDT), a trust fund focused primarily on transport decarbonization (Pangestu 2021). However, its remit is primarily to look at overall transport. The G20 nations should focus on creating a parallel international body focused on financial issues from a maritime perspective complementing the work of the IMO but with more significant financial capabilities. This body could, in theory, help with bridge financing at discounted rates for public investment in new zero-carbon bunkering infrastructure creation. This could also be a body under the auspices of the G20 Transport Task Group (G20 TTG) and could help mitigate financial risks by developing and building infrastructure and scale up support services. As the timeline for the development of clean fuels and building scale to meet the expected demand for these fuels is short, it will be a challenge; it would be prudent to help develop an organization that has a focused mandate on the shipping industry, with the combined might of the G20 and also with specialist expertise in pricing risks (associated financial and non-financial risks) of the proposed energy transition into a SPV (Special Purpose Vehicle) built especially for the purpose. This will become more and more critical as standard financial intermediaries start to retreat from the maritime fuel market, posing essential risks of supply to the global shipping fleet. New lines of credit could become hard to find, and the transition can potentially risk global economic growth.

Conclusion

As the energy transition moves forward with increasing penetration of low-carbon energy resources, it is increasingly becoming critical that energy resilience is going to be a key issue for the energy transition to be successful. This energy resilience will be in the form of ensuring the gradual displacement of fossil-fuel based energy resources while ensuring that the energy access and reliability that fossil-fuels provide are not impacted. The economic growth that is needed to bring down global income inequality can be impacted by an energy transition that does not consider all the order of magnitude impacts from issues ranging from supply chain disruptions to managing clean fuel transitions. The G20 is well placed to ensure that policy makers worldwide pay attention to the frameworks that are being developed, like the Circular Carbon Economy to manage the energy transition.

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G20 Needs to Achieve Consensus: Group Could Face Polarization if It Concentrated on Interests of the West alone

G20 is a global strategic forum that brings together developed and developing countries. If the G20 concentrates primarily on the interests of the leading Western countries, it risks polarization. The G20 may lose sight of its founding goal as a catalyst for forging global cooperation to address serious global issues. The Rome summit yielded no fresh ideas. The objective of vaccinating 40 per cent of the world's population by 2021 has not been attained. One apparent failure in Rome was the lack of new commitments to reduce GHG emissions. The summit just agreed to work toward reaching worldwide net zero emissions by 2050. Coal was not agreed upon in Rome. This year's taxpayer funding of new coal power generation must terminate. The debt burden of poor countries requires quick attention due to its substantial economic and social implications. The organisation must strive hard to avoid political entanglements generated by individual members' self-interests, political systems of government, and ideologies.

Source: https://gulfnews.com/opinion/op-eds/g20-needs-to-achieve-consensus-1.84185803

Indonesia Seeks a Synchronized Monetary Exit Policy at G20

As developed countries begin to tighten monetary policy as their economy recover from the COVID-19 pandemic, Indonesia, the current G20 Presidency will seek synchronized global policy normalization. Indonesia urged the developed world to normalize policy in a "fully calibrated, well planned, and well communicated" manner to avoid spillover effects on emerging countries that are still recovering. As price hikes began to heat up, authorities around the world were taking back the loose monetary and fiscal policies they had established to cushion their economies from the pandemic's impact. Sri Mulyani Indrawati, Finance Minister of Indonesia emphasised that developed nations should take measured moves, and address the problems that are microstructural in nature.

Source: https://www.reuters.com/markets/rates-bonds/indonesia-seeks-synchronised-monetary-exit-policy-g20-2021-12-09/

The G20 Common Framework for Debt Treatments Must Be Stepped Up

Despite massive COVID-19 crisis-related relief initiatives, approximately 60 per cent of low-income countries are at risk of or already in debt distress. New COVID variants are progressively disrupting economic operations. In the absence of G20 creditors agreeing to accelerate debt restructurings and halt debt service, certain nations may suffer economic collapse. G20 created the Common Framework to help these countries with debt restructuring, insolvency, and long-term liquidity concerns, but it has not delivered. First, the multiple procedures and dates involved in the Common Framework process must be clarified. In addition, a complete suspension of debt service payments throughout the discussion would provide much needed relief to the debtor. Third, the Common Framework should describe how the comparability of treatment would be successfully enforced, including as appropriate by implementing the IMF arrears policy. Another important addition is to include other deeply indebted countries that could benefit from creditor coordination. Consolidating debt requires prompt action.

Source: https://blogs.imf.org/2021/12/02/the-g20-common-framework-for-debt-treatments-must-be-stepped-up/

Debt Crisis: What Next as IMF and G20 Initiatives Set to Expire?

DSSI, which suspends debt payments on bilateral public debt to G20 countries, expires in December 2021, and the IMF's Catastrophe Containment and Relief Trust (CCRT), which provides countries with grants to help them make IMF debt payments, expires on January 10, 2022. As per a study by a civil society organization in UK, hardly a fifth of the G20's $35 billion debt suspension was delivered. The CCRT provided $850.7 million in debt relief to 29 countries in four tranches, ignoring much of Latin America, where only Haiti benefited. The G20 Common Framework for Debt Treatments will be the only active global debt support mechanism. Further, three countries such as Chad, Ethiopia and Zambia have sought debt relief under the effort with little success. On the other hand, 23 countries do not qualify for the Common Framework or the DSSI, although risking roughly 65 per cent of total debt service.

Source: https://www.brettonwoodsproject.org/2021/12/debt-crisis-what-next-as-imf-and-g20-initiatives-set-to-expire/

G20 Summit: Oxfam Urges Action on COVID-19, Climate, Poverty and Hunger

Oxfam, a global coalition of 20 humanitarian organizations, has urged world leaders to act quickly to address the novel coronavirus illness (COVID-19), climate change, poverty, and hunger. More than 40 million people have gone hungry, principally as a result of economic shocks brought on by the pandemic. Global food prices have risen by 40 per cent as a result of high unemployment and badly damaged food production. G20 has the potential to make a significant difference by demonstrating political will and utilizing its international leadership to shape a better future. G20 must take action to address the climate catastrophe since the poorest people, who have the fewest resources and have done the least to cause the situation, have been struck the worst.

Source: https://www.downtoearth.org.in/news/climate-change/g20-summit-oxfam-urges-action-on-covid-19-climate-poverty-and-hunger-79938

ILO Welcomes G20 Endorsement of Human-Centred Approach to COVID-19 Recovery

G20 leaders pledged to promote safe and healthy workplaces, fairness, and social debate, citing the COVID-19 epidemic's inequities. Social protection mechanisms will be improved to reduce inequities, eliminate poverty, aid worker transitions and reintegration, and promote inclusive and sustainable growth. The vast difference between richer and lower income countries was underlined by the ILO Director-General. An equitable shift to greener economies was also crucial. The Leaders' Declaration reaffirmed countries' commitment to gender equality and women's empowerment with a particular focus on closing the wage gap. Encouraging young people to develop their talents and integrating migrants and refugees in the pandemic response were also prioritised. The Declaration calls on the ILO and the OECD to keep an eye on the Antalya Youth Goal.

Source: https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_826032/lang--en/index.htm

Top Economists Call for Radical Redirection of the Economy to Put Health for All at the Centre in the Run-up to G20

On average, 133 doses of COVID-19 vaccination were given to every 100 persons in high-income nations, but only four doses were given to each person in low-income countries highlighting the global discrepancies in access to health care and health goods. A major shift from economic health to universal health is possible as the G20 summit approaches in Rome. Expanding health-related funding and directing it more effectively are the major challenges. Health finance should be viewed as a long-term investment rather than a short-term cost, according to the WHO Council on the Economics of Health for All (CEHFA). To achieve this, the Council has developed a new brief on Financing Health for All, which focuses on two essential dimensions: more and better finance and lays out the way forward through three pathways to action: Creating fiscal space, directing investments to ensure Health for All becomes the central purpose of economic activities and Governing public and private finance. Ensuring a sustainable influence on people's lives requires more than just greater money for the health industry.

Source: https://www.who.int/news/item/26-10-2021-top-economists-call-for-radical-redirection-of-the-economy-to-put-health-for-all-at-the-centre-in-the-run-up-to-g20

G20 Leaders Endorse Global Corporate Minimum Tax but Wrangle over Climate

The G20 backed a "historic" accord that would impose a minimum 15 per cent tax on multinational corporations. The agreement would put an end to the harmful race to the lowest on corporation taxes. The reform plan aims to put a stop to huge corporations like Apple and Google's parent company, Alphabet, hiding profits in low-tax countries. The stakes are enormous, as the G20 countries — China, the United States, India, the European Union, and Russia — account for over 80 per cent of global GDP and nearly 80 per cent of greenhouse gas emissions. However, G20 countries, many of whom are at various stages of economic development, continue to disagree on the second major target of achieving net zero greenhouse gas emissions by 2050.

Source: https://www.france24.com/en/europe/20211030-climate-and-the-global-economy-to-top-agenda-at-g20-rome-summit

About G20 Digest

G20 has emerged as an important global forum over the years, and G20 Leaders' Summits are watched worldwide with interest and suspicion. Successive presidencies of G20 have encapsulated a vast array of issues beyond the financial sector; each having potential impact on trade & investment, global governance and social sector. Each presidency has contributed to the summit process by adding new issues along with the routine ones resulting in a wider and diverse G20 Agenda. In view of the diversity of issues and complex challenges the world is grappling with, the expectations from G20 has multiplied. It is imperative to comprehend and assess the rise of G20, and its role and function in shaping the future global order. In order to motivate and stimulate fresh ideas on G20 and its implications for global economy, RIS brings out the quarterly journal, G20 Digest, as a platform to compare, contrast and create new knowledge that matter for the people in the G20 countries and in the world, including the developing and less developed countries.

Guidelines for Submissions

- *G20 Digest* is a peer-reviewed journal dedicated to the issues and subject matters relating to G20 and its broader linkages to global governance, functioning of multilateral institutions, role of emerging markets, and larger development interests of the people.
- Scholarly articles on various topics of interest to G20 are invited from academics, policy makers, diplomats, practitioners and students. The articles may cover the whole range of issues including role and effectiveness of G20, functioning of G20, coverage of sectors, G20 and global governance, G20 and global financial stability, and similar topics.
- Original manuscripts not exceeding 5000 words prepared in MS Word using double space with a 100 word abstract and three key words may be sent to pdash@ris.org.in.
- The submitted articles must follow APA referencing style.
- All numbers below 10 should be spelt out in words such as 'five' 'eight', etc.
- Percentage should be marked as 'per cent', not '%'.
- For numeric expressions, use international units such as 'thousands', 'millions', 'billions', not 'lakh' and 'crore'.
- For time periods, use the format '2000-2008', not '2000-08'.
- Mere submission of an article does not guarantee its publication in the journal.

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Core IV-B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi-110 003, India., Ph. 91-11-24682177-80
Fax: 91-11-24682173-74, Email: dgoffice@ris.org.in
Website: www.ris.org.in

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