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G20 Digest

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'Troika' as Effective Mode of Continuity and Inspiration in G20

G20 has been practising 'troika'- a combination of three members - the immediate past presidency, the current presidency and the upcoming presidency which helps maintain continuity of the process and perhaps inspiring the upcoming presidency in terms of preparedness. This is a novel approach as learning from the past could provide useful insights for replication and course correction in the upcoming presidency if anything found inefficient in the process. Beginning with the Indonesian presidency in 2022, the four consecutive presidencies, e.g. Indonesia, India, Brazil and South Africa, are emerging markets (developing countries). Although developing country members of G20 like Mexico, Argentina and Turkey have led the G20 process in the past, the consecutive presidency could probably maintain a healthy continuum of debates and negotiations on the G20 platform on important issues of post-COVID recovery and developmental challenges faced by the developing countries including LDCs. In fact, the three upcoming presidencies -India, Brazil and South Africa - are birds of the same feather even though their global aspirations and national economic policies are not homogenous in its entirety. The three countries are already working together in BRICS and IBSA for cooperation on several fronts. At this crucial juncture, the 'troika' could work in real sense toward resolving a number of global economic challenges such as rising food and energy prices, nutritional insecurity, high sovereign debt, involuntary unemployment, distressed migration, drying up of private investment in productive sectors, etc.

While numerous issues could be taken up in the 'troika' process and in the agenda of the upcoming presidencies, this issue of *G20 Digest* brings perspectives and opinion on certain topics of interest to the G20; from developing countries in particular. Given the massive economic loss during Covid-19 and successive geo-political tension across countries in the world, the onus rests on reviving multilateral cooperation in its true spirit. The paper on multilateralism captures the nuances in the geo-political environment and its implications for the efficacy of negotiations at the G20 platform. Many countries are grappling with food security and nutritional challenges which has worsened during the pandemic. There is perhaps a need to look at quality of food than ensuing adequate food alone. Food systems approach is being viewed as an integral approach to mitigate the food problems in countries. The paper argues for a food and nutrition security framework in G20 as a roadmap for the developing countries.

Agriculture sector worldwide is undergoing transformation in view of new digital technologies. Digital transformation along with sustainability could yield productivity gains, bridge information asymmetry and help the small and marginal farmers. Weather mapping, precision agriculture, start-up innovations, etc. are promising areas of transformation in agriculture. The paper on digital transformation of agri-food systems covers some of those aspects in greater detail. Fourth Industrial Revolution (4IR) is believed to be the driver of next economic transformation. The paper on 4IR discusses the roadmap for developing countries to make this transition smooth and favourable.

Last but not the least, infrastructure is the lifeline for many developing countries in the world. As required, a lot of attention has gone to infrastructure in the G20 process, which is good mostly from the perspective of mobilising investments and unlocking innovative sources of funding. The role of private and institutional investors has been emphasized during various presidencies of G20 in the recent years. Besides funding issues, robust planning and execution of infrastructure projects matters especially in developing countries. The paper in this edition makes a case of G20 support in improving project cycles in Africa. Pooling best practices from various parts of the world and necessary capacity building along with innovative financing could help countries build new-age infrastructure that, in turn, aid the development process.

We hope the readers of this issue of *G20 Digest* will find it interesting and informative.

Enjoy reading it.

Priyadarshi Dash

Research Article

The Fate of Multilateralism in the Age of Uncertainty

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Davide Tentori[*] and Antonio Villafranca[**]

Abstract: Numerous challenges have been brought by the Covid-19 pandemic which poses a threat to our future. The invasion of Ukraine by Russia has had a detrimental effect on the possibilities for multilateral collaboration globally and economically. This will inevitably affect the outcome of the G20 Summit in Bali. The G20 could act as a catalyser of the fresh impetus for global cooperation, fostering coordinated action in the focused policy areas. In this regard, the G7 should also be utilised as a platform to foster greater intergovernmental collaboration as well as to create opportunities for the West and the rest of the world to cooperate.

Introduction

After outbreak of the Covid-19 pandemic in 2020, 2021 seemed a promising year, thanks not only to economic recovery but also to a (partial) "revival" of multilateralism. In 2022, Russia's invasion of Ukraine sounds like a "wake-up call" triggering geo-political and economic turmoil on the global scale and casting doubts on the prospects for multilateral cooperation. However, even at a time when States focus on short-term priorities such as economic slowdown and skyrocketing energy and commodity prices, long-term challenges ranging from climate change to global health and international trade remain. How to address them in such an uncertain scenario? Is the G20 still fit for purpose given the increasing political and economic fragmentation among its members? And is there still room for the G7 to build bridges and opportunities for cooperation between the West and the "rest"? We argue that low-hanging fruits of key multilateral issues can still be reaped, provided that G20 members adopt a down-to-earth approach and show goodwill. The G7 may lead by example on a number of policy areas, thus

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fostering coordination among countries willing to share a set of common values and principles.

Fragmentation: The Global Buzzword

After 2020 – an incredibly complicated year for international relations due to the outbreak of the pandemic – 2021 looked like a promising year for a "double" recovery, with respect to both the global economy and multilateralism. World GDP grew by 6.1 per cent in 2021, an impressive rebound if compared to the global recession (–3.5 per cent) that occurred in 2020 (IMF 2022). Moreover, last year time seemed ripe to revive (at least partially) multilateralism, thanks to some concrete steps and tangible results achieved on the occasion of key international summits: the G20 in Rome, with the political agreement on a global minimum tax and the promised boost of COVID vaccination campaigns in lower-income countries; and COP26 in Glasgow (long-awaited after its cancellation due to the pandemic), with the acknowledgement of 1.5°C as the ceiling target to contain global warming by the turn of the century. In other words, apparently the unexpected and unprecedented shock produced by Covid-19 on globalisation triggered a positive and collective reaction by the global community, based on the growing awareness that global challenges such as a health emergency or climate change could be addressed and overcome only through common efforts.

February 24 turned out to be a wake-up call. Russia's invasion of Ukraine started a conflict which has a limited geographic scale, but far-reaching consequences from the geo-political and economic point of view. As a result, the war produced a considerable "setback" to the global recovery, with growth forecasts for 2022 revised downwards by 0.8 per cent, from 4.4 per cent in January to 3.6 per cent in April (IMF, 2022), and figures may further worsen over the next months. The impact of the war – the second "black swan" for international relations in less than three years – is going to be different from the one suffered in 2020: if the pandemic brought about a cross-cutting shock to the global economy with almost no country able to escape, the effects of the war will produce many "losers", but also a few "winners". Among the former, countries that are net commodity importers will certainly be the ones suffering the most. But some countries and regions, in particular those producing and exporting fossil fuels and raw materials, are going to benefit from the new reality: to be sure, at G20 level only the growth prospects of Argentina, Australia, Canada and Saudi Arabia have improved, by 1.7 per cent, 0.5 per cent, 0.1 per cent and 1.5 per cent respectively (ISPI, 2022), propelled by skyrocketing prices of energy, food and other critical commodities.

Moreover, the very fact that the impressive rounds of economic sanctions imposed on Russia by Western countries have not been matched by similar measures by other countries is likely to increase economic fragmentation as well as political divisions, with Russia increasingly tempted to turn to China after the agreement sealed in early February by Vladimir Putin and Xi Jinping on a "limitless friendship". Indeed, it is a very unbalanced 'friendship' with Beijing as the senior partner and keen to include Moscow within its geopolitical sphere of influence (Kaczmarski, 2022).

The war in Ukraine is likely to accelerate a longstanding process out of which an increasing division of the world into blocs is emerging. If one takes a look at how the vote on the UN Resolution on Russia's invasion of Ukraine is distributed on the world map, 64 per cent of the world's population live in countries which are not condemning Russia. This also equals to 41 per cent of global GDP and 61 per cent of global economic growth over the last decade (Magri, 2022). In short, today's complex international scenario is marked by different systems of alliances with "variable geometries". However, a "Cold War-style" distribution of power does not seem around the corner as political and economic ties are still binding regional blocs strongly together. The growing number of Regional and Preferential Trade Agreements (now amounting to around 350 (Facchini, Silva, Willmann, 2021) provide a clear-cut example. On the one hand, while this contributes to preserve free trade flows and economic ties worldwide, on the other hand the resulting "spaghetti bowl" are further fuelling economic fragmentation and uncertainty (Kloewer, 2016). A case in point is the growing number of trade and economic partnerships in the Indo-Pacific area, with countries in the region engaging in a number of (partially overlapping) deals: the Regional Comprehensive and Economic Partnership, the Comprehensive and Progressive Trans-Pacific Partnership, the ASEAN, with the recent Indo-Pacific Economic Framework (the latest US-led initiative) adding on top of them (Fasulo, 2022).

Against this background, progress on the multilateral agenda seems anything but easy in the short term. Nevertheless, urgent global issues remain on the table and no concrete result will be available without joint efforts. Is it still possible to find a common denominator and make at least a few concrete steps ahead despite today's international turmoil?

Carrying the Multilateral Agenda Forward

Despite today's fragmented global landscape and geo-political tensions, the case for multilateral cooperation remains stronger than ever. The world is, in fact, facing a wide set of challenges that threaten our future. They can only be addressed by involving all major economic and political players. Global issues call for global solutions, and unilateral or uncoordinated actions, even when taken in good faith, risk being ineffective if not followed-up by most actors. The Covid-19 pandemic, which has ravaged across the world for more than two years, has shown beyond any doubt that no nation - not even the biggest or richest one – can shield itself completely from external threats and proceed on its own path. Only by joining forces, sharing knowledge and best practices, and coordinating policies, countries have been able to fend off the worst of it and go (partially) back to normality. Yet, this holds true mostly for advanced economies (if more dangerous variants of the virus do not show up), while developing countries are still struggling to contain the disease.

Cooperation is key to tackle another challenge, the one that is key to our lives, economies and societies: the very future of our planet. Just like infectious diseases, pollution and global warming ignore borders and create spill-over effects that affect countries on the other side of the world. Nations have to come

together to face threats caused by higher temperatures, advancing desertification, and rising sea levels. Uncontrolled changes spurred by global warming would radically impact global economy and alter long-standing dynamics, a scenario that no country can face – let alone counter – on its own.

Climate is undoubtedly the domain where there is the greatest urgency for effective multilateral cooperation. Despite its short history, climate diplomacy has already achieved a lot: just think of the Montreal Protocol – so far the only climate treaty ratified by all countries – signed in 1987, only two years after the discovery of the Ozone hole. In 1992 the UN Members in Rio de Janeiro agreed to establish the United Nations Framework Convention on Climate Change (UNFCCC) which, albeit not being a fully-fledged international organization, still provides the international legal framework to make progress on climate negotiations mostly through the Conferences of Parties (COPs). Although some of the recent rounds have been largely deemed unsatisfactory – especially the Madrid and Katowice Conferences – COP26 brought back a glimmer of hope and reinforced the case for multilateral action in the climate domain. High expectations, largely fuelled by the US return to the Paris Agreement, were partly disapproved by those advocating for higher ambition; yet the overall result was positive, showing that collective engagement can actually deliver, even in a phase marked by geo-political tensions.

Despite the lack of a clear commitment to phase-out coal, countries and stakeholders made significant progress, especially thanks to different initiatives aimed at limiting the use of fossil fuels and supporting the deployment of renewables (Salomoni, 2022). COP26 showed that the international rivalry between the US and China may be (temporarily) put in the "backstage", and COP27 in Egypt should provide a new opportunity for climate-focused multilateralism to deliver despite today's harsh times. More concretely, COP27 could bring about greater financial commitments to developing countries in the areas of mitigation and adaptation, bridging a gap that often leaves the most vulnerable without adequate resources to face the consequences of global warming. Additionally, thanks also to the current European Investment Bank's Presidency of the Heads of Multilateral Development Banks' group, COP27 would provide the most adequate framework to bring such financial institutions at the forefront of the fight against climate change, not only in Europe. While pledges to cut emissions make the headlines, financial resources are the key concern for most emerging countries, both to adequately pursue their decarbonization objectives and to compensate part of the economic losses caused by rising temperatures, droughts, and rising sea levels.

According to a Climate Analytics report, non-cooperation in the environmental field has a high price for the Earth: in a non-cooperation scenario by 2100 global temperatures would increase by an average 4.4 degrees Celsius, with a global GDP per capita reduction of (-)30 per cent caused by the extreme weather conditions and the financial instability that would follow. On the other hand, the commitments undertaken so far in international fora would limit the increase to 2.7 degrees and reduce GDP per capita losses to 15-25 per cent. Finally, going the extra mile and increasing commitments to limit the

increase to 1.5 degrees, thanks to greater international action, would limit losses to (-)8 per cent (Williams *et. al.* 2021).

Climate-focused multilateralism is only one of several dimensions where the world as a whole would benefit from renewed cooperation among States. International trade is by its own nature an area where countries are supposed to coordinate, shape policies and agree on a common set of rules. However, recent years had been marked by a sharp turn towards unilateral measures and protectionist policies: even before the Covid-19 pandemic, growing trade tensions had been partially responsible for a slowdown in global economic growth (OECD, 2019). The pandemic had an immediate impact on trade measures, given the high number of export restrictions for medical goods that many states implemented in 2020, but also on trade governance itself. The WTO 12th Ministerial Conference, initially planned for 2020, had been postponed for several times until June 2022. The international gathering, although falling short of achieving a major (and long needed) reform of the Geneva-based organisation, managed to reach some important results and, most importantly, showed that the WTO is "still alive" and remains a pillar of the global economic architecture. The "Geneva Package", as the set of newly agreed-upon measures was defined by WTO's Secretary-General Ngozi Okonjo-Iweala, mainly consists of provisions protecting the World Food Programme from unnecessary export restrictions, of the gradual phase-out of subsidies to fishing activities that threaten the oceans' ecosystems and harm competition, and in an extended moratorium on data flows tariffs (Latino, 2022).

Nonetheless, the limited results obtained vis-à-vis high expectations show how important it is to preserve an environment open to cooperation and to avoid unilateral initiatives that can threaten global economy. While the era of "trade wars" will hopefully be behind us, particularly after the US announcement about the likely removal of additional tariffs against China (FT, 2022), trade restrictions are growing as a consequence of the war in Ukraine, both due to sanctions and export bans on key food commodities (Global Trade Alert, 2022) with huge risks in particular for low-income countries. Globalisation and trade liberalisation have spurred economic growth everywhere (Irwin, 2022) and it is hence pretty clear that globalisation is not doomed to end. It is rather going to take a different shape through the definition of new economic partnerships along supply chains (either global or regional). Such redefinition process cannot be carried forward through unilateral initiatives- that would eventually lead to higher fragmentation- but only through multilateral engagements in further rounds of negotiations aimed at completing the reform of the WTO and making it fit to address the new challenges to international trade posed by the digital and green transitions (Mildner *et. al.* 2022).

Nothing has shown the damages of unilateral trade actions as much as the Covid-19 pandemic when countries have hoarded medical supplies for themselves, blocked the export of crucial pharmaceutical products or shut down their borders without coordinating even with their neighbours. This behaviour has resulted in significant harm both to people's health and economies and

has been most evident in what GAVI Chair José Manuel Barroso described as "vaccine nationalism" (Barroso, 2021). Advanced economies developed and administered Covid-19 vaccines at an unprecedented pace in medical history and, while this would remain a huge scientific achievement, the rest of the world had to wait, favouring the birth and spread of new variants. This pandemic demonstrated the dire need for greater cooperation on health issues and made it clear how pandemics are systemic risks for the whole global community and that it is imperative to boost global preparedness for future infectious diseases (Agrawal, Gopinath, 2022).

In the current scenario, multilateral coordination should especially start from a comprehensive approach and, following the "One Health" principle, address the wider set of dynamics that contribute to the development and spread of diseases. Climate change, variations in land use, and trade practices are all elements that contribute to spill-over infections from animals to humans (Carlson, Albery Phelan, 2020). While outbreaks would always be a possibility, transparent and adequate international cooperation from the very start would prevent them from turning into pandemics, avoiding the mistakes that have been made with Covid-19. The production of pharmaceuticals, in fact, is based on complex global supply chains, and the breaking of a single link in the chain might result in numerous countries being unable to get medicaments or supplies needed to contain the spread of viruses. Global economic interdependence means that no country can effectively shield itself from the consequences of a new health crisis and multilateralism remains the only sensible dimension to build preparedness.

Vaccine nationalism and the unequal distribution of Covid-19 treatments highlighted and exacerbated another area where multilateral cooperation is needed i.e. the gap between the world's rich and poor. In fact, the inability to obtain vaccines severely affected the ability of low-income and emerging economies to recover effectively from the pandemic downturn, paving the way to increased global divergence (IMF, 2021). Such a divergence creates significant economic risks and hampers, especially in the current context of rising interest rates, financial stability in countries lacking adequate fiscal resources, triggering fears of new debt crises (Georgieva, 2022). In the midst of the pandemic, the G20 Finance Track already tried to tackle the financial difficulties of emerging countries with the Debt Service Suspension Initiative, alleviating, albeit partially, the budgetary distress of vulnerable countries and paving the way for debt restructuring (Bruni, 2021). Yet, the monetary tightening that followed the war in Ukraine and the inflationary pressures coming from record-high energy and food prices require renewed commitment by major economic players and multilateral institutions to prevent new shocks.

From the G7 to the G20: Building Bridges

Today's international landscape undermines the effectiveness of multilateral mechanisms and organizations, starting from the G20. Therefore, a question arises regarding the role that alternative formats can play to support the multilateral agenda. The G7

is a sort of "club" gathering the Western world's most important democracies and economies. Is the G7 still a useful forum or is it doomed to irrelevance in a world marked by growing fragmentation? From a strictly economic viewpoint (i.e. in terms of GDP per country), the G7 draws an old picture. China and India should be included in the G7 while Italy should have been excluded already a few years ago. Actually, today the G7 should be considered mainly for its geo-political meaning and relevance, grouping the "West" versus the "rest" of the world. It is making an effort to become more inclusive and engage other countries that are part of the G20 and beyond. For example, at this year's G7 summit five countries that meet the "requirement" of emerging democracies were invited as "guests": Argentina, India, Indonesia (also in its capacity as the current G20 Chair), Senegal and South Africa. It is noteworthy that Delhi and Pretoria are also part (together with Brazil, China and Russia) of the BRICS forum, whose summit had been held under the Chinese presidency only a few months before. Although the BRICS is still far from gathering fully like-minded countries, it is worth noting that none of its members officially condemned Russia's illegal invasion of Ukraine nor adopted sanctions against Moscow. This means that, beyond the community of Western democracies – which have been showing a remarkable degree of unity after some years of worrying fragmentation and divisions – there is a significant number of rising powers that do not necessarily share the West's same set of values and legitimately pursue their own agendas (provided this is compliant with the rules defined by international law) (Fasulo, 2022).

Against this background, it would not be meaningful and useful for the G7 to adopt defensive strategies leading to "fortress" scenarios that would eventually widen existing cleavages with the rest of the world. It would be much helpful to the multilateral system as a whole to rely on the G7 as a "bridge" between the most advanced democracies and emerging countries, with Western countries paving the way to a new approach to multilateral issues and playing the role of frontrunners in addressing key global challenges. The G7 could do that by enhancing legitimacy through inclusivity, offering a space for trusted international cooperation among like-minded countries (Winter, 2022). The G7 is already trying to play the role of "bridge builder" by pledging investments in quality, sustainable infrastructure. The economic benefits of infrastructure are crucial to unlock long-term economic growth and to reduce economic and social divides between advanced economies and poorer countries through improved connectivity (Tentori and Gili, 2021).

One of the main commitments made by the G7 in Elmau was the announcement of US$ 600 billion that will be invested in sustainable infrastructure projects in developing countries by 2027. However, on closer inspection, it seems that this is merely a "patchwork" of resources that had already been largely allocated: there are in fact the US$ 300 billion of the Global Gateway, a strategy launched by the European Commission at the end of 2021 to mobilise investments in connectivity and quality infrastructures above all through development banks such as the EIB and the EBRD. Then there are US$200 billion that the United States has promised through the "BuildBackBetter for the World" (B3W) initiative, aimed

at bridging the infrastructural gap in developing countries which was launched at last year's G7 summit, but which until now has struggled to take off. Finally, the last US$100 billion should be guaranteed by other members of the forum. In the intentions of the G7 leaders, this US$600 billion should be only a first step with a view to attracting further resources through multilateral financial institutions, national development banks and sovereign wealth funds. Of course, the rationale behind these pledges is also 'strategic' as they aim to counter China's economic expansion in emerging markets. Indeed, the Chinese "firepower" through the BRI seems much more intense. Although official figures are not fully available, Beijing has apparently planned investments in excess of US$1000 billion by 2027. So, one question arises: to what extent will G7 investments truly facilitate free and smooth trade instead of simply trying to counter China's geo-political influence, with the risk of duplication and overlapping with existing projects?

Infrastructure investment is only one of the areas where the G7 can build "bridges" (not only tangible assets, but also in 'diplomatic' terms) with other key powers and emerging countries. Trade, climate policy, global health, economic recovery and financial stability: many are the policy domains where the G7 could lead by example, pioneering innovative and forward-looking measures and involving other countries through an effective and inclusive outreach that would find its ideal and most appropriate dimension within the G20.

Conclusion: Time for Realistic Ambitions

If 2021 was promising and somehow successful for multilateralism, 2022 is going to be a troubled year. Geo-political tensions, economic slowdown, skyrocketing energy and commodity prices reduce the room for common. This will inevitably affect the outcome of the G20 Summit in Bali, hosted by Indonesia, with growing obstacles to ambitious and far-reaching deliverables. It would be better to prioritize low-hanging fruits in a number of areas – climate change, trade policy, global health – capitalising and building on results obtained in other fora and institutions, such as the COP26 last year and at the WTO MC12 this year. The G20 could act as a catalyzer of fresh impetus for global cooperation, fostering coordinated action in these policy areas (Georgieva, 2022). And the G7 should be used as a platform to increase like-mindedness among the States ready to share values and principles, rather than an attempt to put in place defensive strategies against emerging powers.

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Research Article

G20: Global Food and Nutrition Security Amidst Stressed Supply Lines

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Pramod Kumar Anand and Krishna Kumar*

Abstract: G20 is well endowed with production of major cereals to collaborate on food security, especially of the Low Income Food Deficit Countries (LIFDCs), all the more as volatility in production leads to higher volatility in trade. Towards this it needs to reposition itself as a credible supplier in the wake of the pandemic, climate change and conflict strained supply chains. In this endeavour, G20 is also at the cusp to promote nutrition-rich crops and items. Moreover, it should facilitate better on access to technology and finance and revisit many of its initiatives to support the global agri-food systems.

Introduction

The year 2022 has witnessed sub-optimal contributions to cereal exports, especially to wheat, in the wake of constrained supply channels from Russia and Ukraine, although some respite may come from the recent understandings to unblock wheat export corridors. Globally production and supply of many other food items, inputs apart, are adversely affected. This is in spite of the proactive global concerns in the recent past, keeping debate on food systems at the global centre stage. At the Tokyo UN Food Security Systems (UNFSS) in September 2021 new commitments and coalitions emerged to pursue a food systems centric approach to pursue SDGs. In December 2021 the Nutrition for Growth (N4G) Summit highlighted linkage between climate change and nutrition. A stark reality is FAO's assessment that in 2022 as many 46 countries need external food assistance[1], up from 44 a quarter ago[2] with inclusion of Sri Lanka (due to serious macroeconomic challenges, significant reduction in 2022 cereal output, and high food prices) and Ukraine (facing difficulties in access to inputs and inability to reach some crop growing areas).

Major Challenges

The major global challenges faced are continued relegation of nutritional aspect, be it through subdued trade in nutrition rich pearl millet and sorghum or for want

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of technology to process such cereals. Moving beyond cereals, lack of adequate awareness is shrinking the vulnerable section's plate further short of items like vegetables, fruits, milk and pulses, in spite of Covid-19 lessons to grow some food at local levels preferably close to the kitchen and within the village.

The FAO's list of 46 countries facing food deficit, includes 33 in Africa, 10 in Asia, two in Latin America and the Caribbean, and one in Europe. Conditions are projected to worsen significantly in West Africa, due to conflicts, high food prices and reduced harvests, while the situation is alarming in East Africa. Humanitarian needs are foreseen to also increase in Southern Africa in late 2022 due to the impact of adverse weather. This is in spite of the global cereal production in 2021 being higher than in 2020 by 0.7 per cent.[3] However, FAO's cereal prospects for 2022 are lower than of 2021 by 0.6 per cent in the wake of drought conditions in some countries, and global elevated input prices.[4]

Climate change as the binding constraint is tightening day by day and triggering frequency of extreme events, which in turn are now spatially wider with shocks much deeper. One can take a cue from loads of evidence of climate change and adverse impacts of rising temperatures from unforeseen patterns of extreme weather conditions, melting icebergs, depleting ozone cover, rising sea levels all *ceteris paribus* leading to falling agriculture productivity, increasing migrations in search of some food security, food production volatility and a consequential higher price volatility besides developments like reducing bio-diversity.

All the more many agro-climatic habitats in the northern parts of South in winter, that overlap in multiplicity of parameters with southern parts of North in summer, are both becoming drier, organism-poor and temperature-volatile at an unprecedented pace, and in dissimilar ways, resultantly shrinking collaborative space. These common challenges call for immediate and much robust collaboration at the G20 platform and credible commitment for investments of resources encompassing financial, human and institutional.

G20 summit declarations and agriculture ministers' communiqués over the years not only underscored the issues of family farmers, small holders and marginal farmers, but also made commitments towards them. And to help the net food importers, as early as in 2011, G20 members had agreed not to impose export restrictions on humanitarian food aid being procured by the World Food Programme (WFP).

Situational Analysis

Volatility Spectrum

The current crisis needs to be first looked at how the volatility in production is generally transmitted to supply, utilisation, trade and ending stocks. Table 1 manifests an idea of the instability matrix across various global cereal parameters. The items covered are total cereals, wheat, rice (milled equivalent) and coarse grains (including maize, barley, millets, sorghum, oats, rye, etc.), for each of which the parameters covered are production, supply, utilisation, trade and ending stocks (agriculture year). The values of coefficient of variation (CV) for production of total cereals, wheat, rice and coarse grains over the 10-year period 2012-13 to 2021-22 are 0.049, 0.046, 0.023 and 0.063 indicating rice production as the

Table 1: Coefficients of Variation (CVs) of Select World Parameters (Over 10-year period 2012-13 to 2021-22)

	Production	Supply	Utilisation	Trade	Ending Stocks
Cereals (total)	0.049	0.063	0.053	0.115	0.105
Wheat	0.046	0.067	0.037	0.085	0.151
Rice	0.023	0.033	0.028	0.085	0.051
Coarse grains	0.063	0.075	0.070	0.157	0.122

Source: Authors' calculations based on FAO Cereal Supply and Demand Brief dated 6th May 2022.

most stable but coarse grain production relatively the most volatile. For each item, among all the five parameters the CV of trade is generally the most volatile except in the case of wheat for which ending stocks are the most volatile.

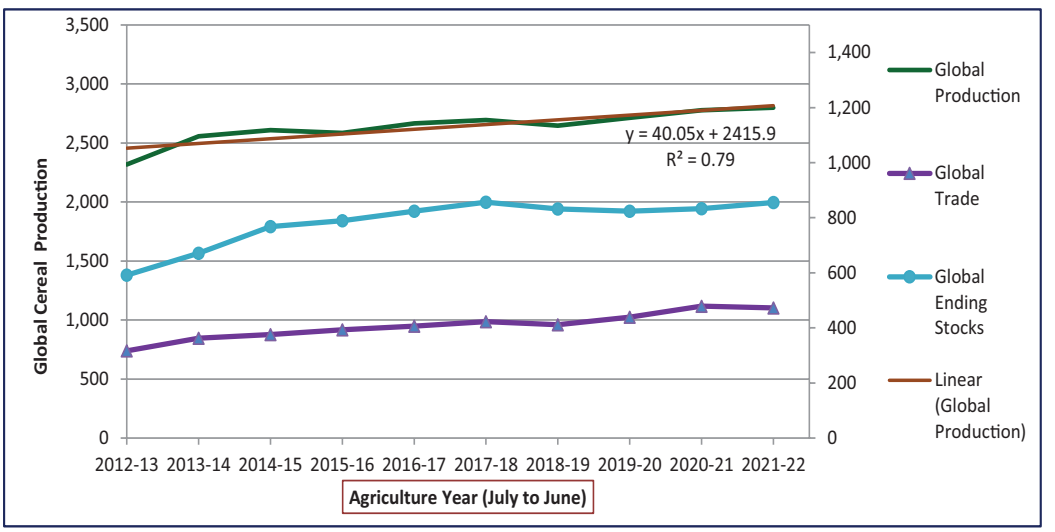
World Total and Select Cereal Markets

A look at Figures 1 to 4 manifests the position of global production, ending stocks and trade for total cereals, wheat, coarse grains and rice respectively over the 10-year period.[5] The global cereal production[6] shows a significant increasing trend over 2012-13 to the period ending 2021-22. Its linear regression over time is significant with a high R^2 value of 0.79, and an annual average increase of 40 million tonnes on the estimated trend line (Figure 1).

These figures also reveal that presently, and so most likely in the next few years, the cereal trade would

Figure 1: World Cereal Market (2012-13 to 2021-22)

(Million Tonne)



Source: Drawn by Authors, based on data from FAO Cereal Supply and Demand Brief, May 2022.

remain dominated by coarse grains and wheat, compared to rice. Therefore, the much-needed push can be accorded to coarse grains that are nutrition rich and adaptive, while firmly holding hands for wheat and rice exporting ecosystems.

The analysis of wheat market (**Figure 2**) depicts that it held its fort during the pandemic on all the three parameters covered namely production, ending stocks and trade, a great source of satisfaction for food security amidst Covid-19 waves.

Each of the three parameters depicted in Figure 3 i.e. production, ending stocks and trade for coarse grains are sizeable constituents of total cereals. However, as perceptible the trade of these underwent a sharper pandemic triggered dip compared to that of total cereals.

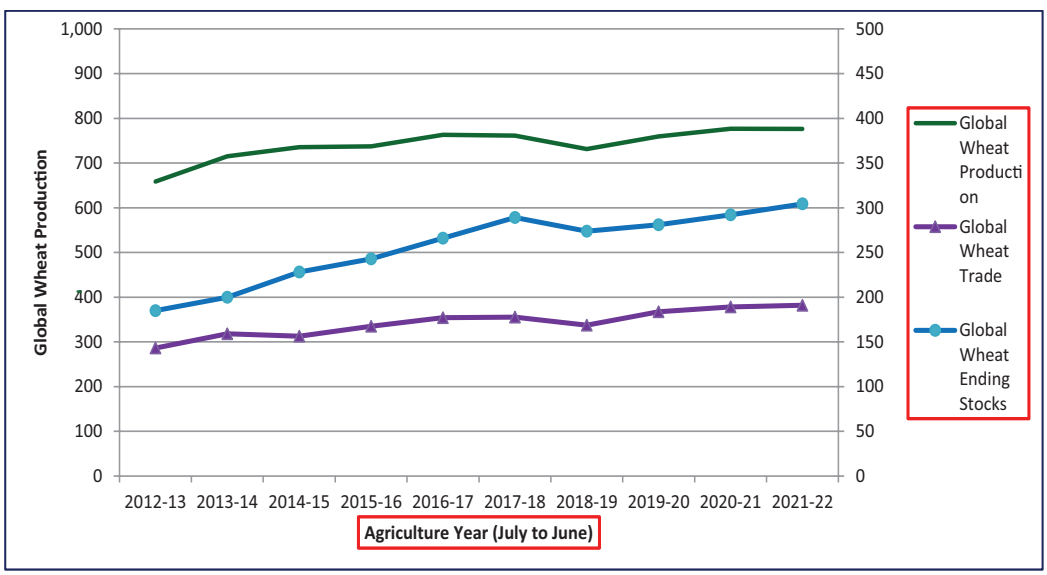
The rice market **(Figure 4)** is undecidedly relatively smaller in size, especially on global trade. Rice performed well on all the three parameters amidst pandemic triggered blows on food security.

Nutritive Cereals Millets and Sorghum

Notably, the UN General Assembly, on a resolution sponsored by India and supported by over 72 member countries declared 2023 as the 'International year of Millets'. It is a twin endorsement of benefits of millets like nutrition, and adaptability with the climate change caused undulating contours. FAO defines millets as a collective group of small seeded annual grasses that are grown as grain crops, primarily on marginal land in dry areas of temperate, subtropical and tropical regions.[7] India is home to the 20 per cent global production of millets[8], which includes 41 per cent of global production of pearl millet.[9]

Figure 2: World Wheat Market (2012-13 to 2021-22)

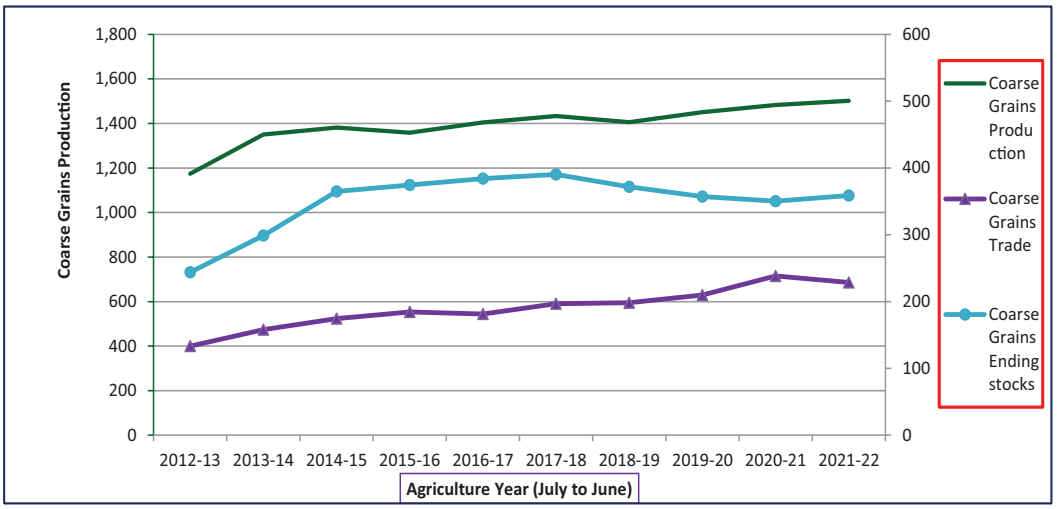
(Million Tonne)



Source: Drawn by Authors based on data from FAO Cereal Supply and Demand Brief, May 2022

Figure 3: World Coarse Grains Market (2012-13 to 2021-22)

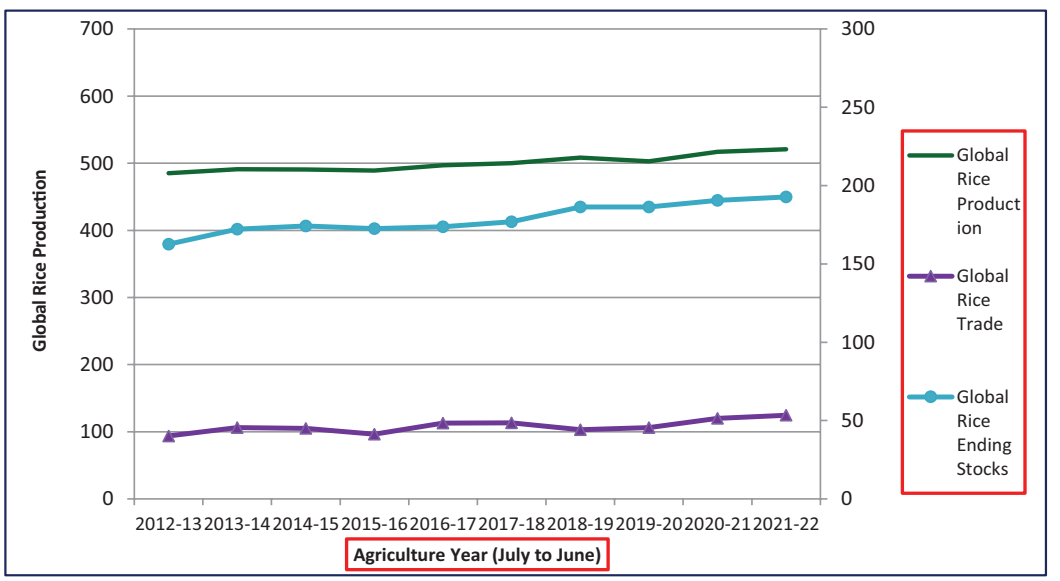
(Million Tonne)



Source: Drawn by Authors based on data from FAO Cereal Supply and Demand Brief, May 2022.

Figure 4: World Rice Market (2012-13 to 2021-22)

(Million Tonne)



Source: Drawn by Authors based on data from FAO Cereal Supply and Demand Brief, May 2022.

Climate mitigation and adaptation being major global concerns, food security through production of low water consuming crops like pearl millet (bajra) and sorghum (jowar) can be handy, but unfortunately these crops are not receiving adequate consumer response to harness their full potential. In fact, pearl millet, a nutrition rich cereal is undergoing reduction in area

cultivated in its largest producer India contributing 41 per cent to its global 2020 basket, Niger and China being the next two with only 11.5 and 7.5 per cent contribution, respectively, the next seven slots were occupied by African countries. It is relevant to mention that compared to pearl millet needing 350 mm of water, the other crops like sorghum millet (jowar), wheat, maize, and rice require 400, 450, 500, and 1,250 mm of water for production.[10] On sorghum quantity production the USA, Nigeria, Ethiopia, India and Mexico were the top five contributors to the global 2020 sorghum basket at around 16.1, 10.8, 8.6, 8.1 and 8.0 per cent respectively. Further, pulses the poor man's protein source, especially for vegetarians, can grow synergically with millet and sorghum as their water requirement on an average is even less.

Current Stressed Global Food Situation

FAO estimates that world cereal production forecast for 2021 (July 2020 to June 2021) was 2,799 million tonnes,.[11] Of it the global wheat output was 777 million tonnes, which was almost same as in 2020. In the global cereal production basket the contribution of coarse grains was 1,502 million tonnes, internally offsetting a higher maize production with a lower barley production compared to the preceding year. Further, the rice production was 520.8 million tonnes (milled equivalent basis). The estimates for 2021-22 are lower than for the preceding year at 2,785 million tonnes, towards which FAO also flags the increasing non-food utilisation of maize as for feed and ethanol production, which would exert more pressure on availability for human consumption.

Moreover, FAO puts forth that Ukraine's lower wheat exports, combined with a sub-normal forecast for its wheat production. Notably, in recent years on the production front, the share of Russian Federation in the world cereal production was four per cent, comprising of world's 10 to 11 per cent wheat, 13 per cent barley, and 1.2 per cent maize production. On the other hand, the share of Ukraine in world cereal production was two to two and half per cent, comprising of world's three and half per cent wheat, around five per cent barley and two to three per cent maize production. FAO, on global exports points out that in 2021, Russia and Ukraine accounted for major shares of global exports of wheat (33 per cent), barley (27 perc ent), maize (17 per cent), sunflower seeds (24 per cent) and sunflower oil (73 per cent). It added that on inputs side Russia was the world's top exporter of nitrogen fertilisers, the second leading supplier of potassium fertilisers and the third largest exporter of phosphorous fertilisers.[12] An analysis of global food security reveals that the recent setbacks to the global food grain situation have left many food security planners reassessing demand-supply mismatch, many consumers in Africa and South Asia deeply concerned on availability, and many poor consumers overawed by sharp price hikes. These facts capture the stress faced by food-security hit countries quite comprehensively. In fact, the crisis is further compounded by abnormally rising global wheat prices.

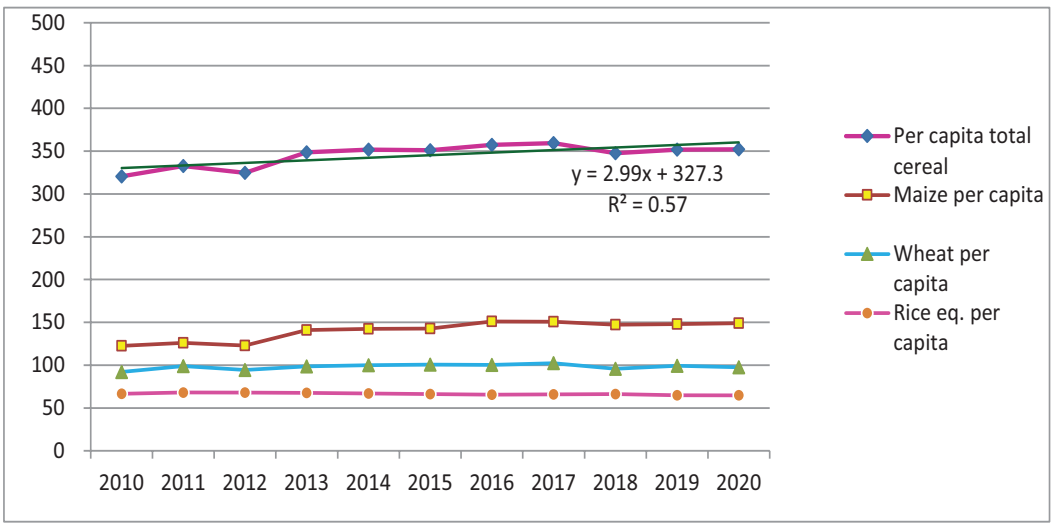
Global Per Capita Cereal Production

Seen from the lens of an individual, the per capita availability needs to internalise the competing impact of rising population. Therefore, in the Figures 5 and 6 the global per capita production over 2010 to 2020 is depicted[13]. As evident, the per capita cereal production is rising at

around 3 kilogram per year from 320.6 in 2010 to 352.1 kg per capita in 2020. An analysis of its constituent crops brings out that in cereals the share of maize is the highest and rises from around 38.2 per cent to 42.4 per cent during the 10 years, revealing the transformation towards ethanol production, the diversion perceived in the eyes of many analysts as a clash between SDG-2 aiming at zero hunger and SDG-7 aiming at renewable energy. This is along with a falling share of wheat from 28.7 per cent to 27.7, and of rice from 20.8 per cent to 18.4 per cent.

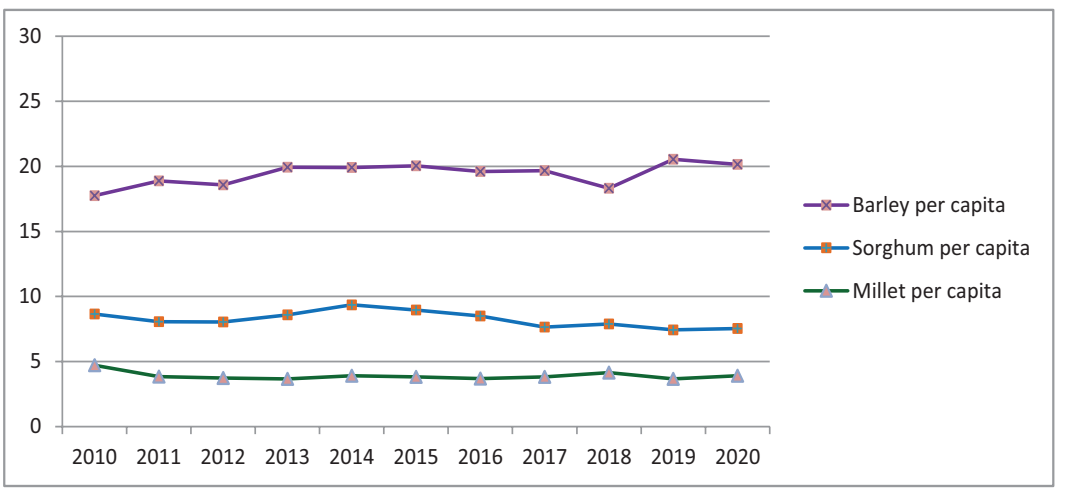
Figure 5: Global Per Capita Total Cereals Production and Top Three Cereals

(kg per year)



Source: Drawn by Authors, based on data from FAOSTAT and UN Population prospects.

Figure 6: Per Capita Production: Next Top Three Major Cereals



Source: Drawn by Authors, based on data from FAOSTAT and UN Population prospects.

The combined share of these three major crops resultantly rises from 87.7 to 88.5 per cent. The fly in the ointment is the falling per capita absolute production of rice, in spite of rising per capita production of the maize and wheat.

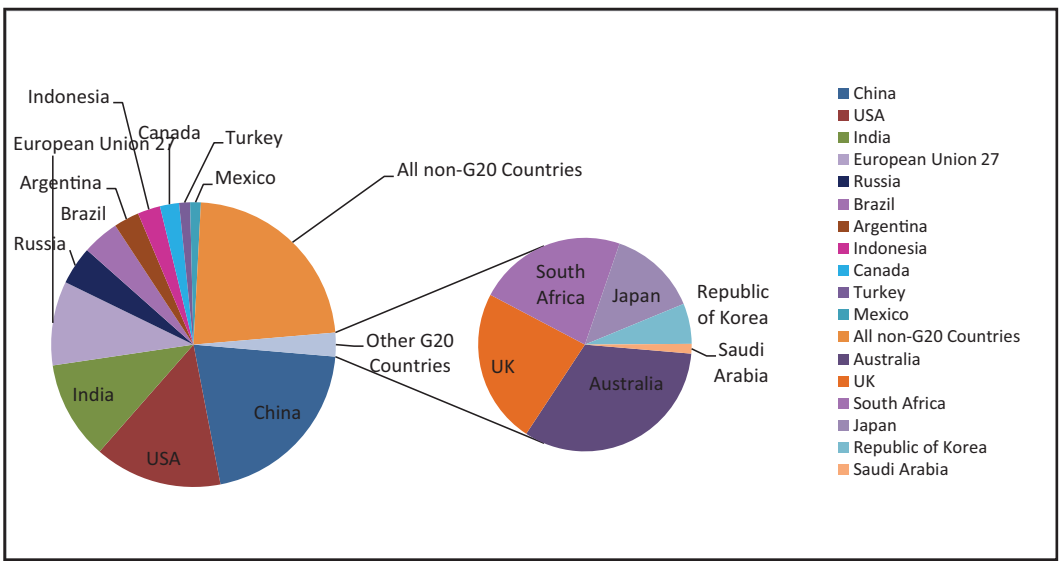
The story of the next three crops barley, sorghum and millet (pearl) indicates (Figure 6) that their combined per capita availability increased slightly during 2010 to 2020 from 31.1 to 31.6 kg per year. Within this lot, while contribution of barley increased from 17.8 to 20.2 kg per year, that of sorghum reduced from 8.7 to 7.5 kg, and of pearl millet reduced from 4.7 to 3.9 kg per year. In the total cereal basket the share of barley was up from 5.5 to 5.7 per cent, but of sorghum and pearl millet reduced from. 2.7 to 2.1 per cent and 1.5 to 1.1 per cent per respectively. This becomes a deep cause of concern for the food security of vulnerable low rainfall countries relatively more dependent on rains and also prone to locust infestation.

G20 as a Major Player in the World Cereal Production

As can be broadly perceived from Figure 7 the G20 countries produced around 77 per cent of world cereals with China (21), the USA (15) and India (11) as the three top producers[14] among them accounting for around 47 per cent of world cereal production of over 2,996 million tonnes in 2020. This in turn (Figure 8) is constituted of G20's 65 per cent share of world's milled **rice** equivalent of over 504 million tonnes the same year of which around 59 per cent points was produced by China (28), India (24) and Indonesia (7). On the wheat front the same year the G20 countries produced 49 per cent of world's wheat (**Figure 9**) of over 760 million tonnes which the three top producers were China (18), the EU27 (17) and India (14). Undoubtedly, G20 countries produce almost half the world production of these food grains and total cereals, so possess capacity to rise to the occasion to address any food security.

Figure 7: G20 Countries in World Cereal Production 2020

(Million Tonne)

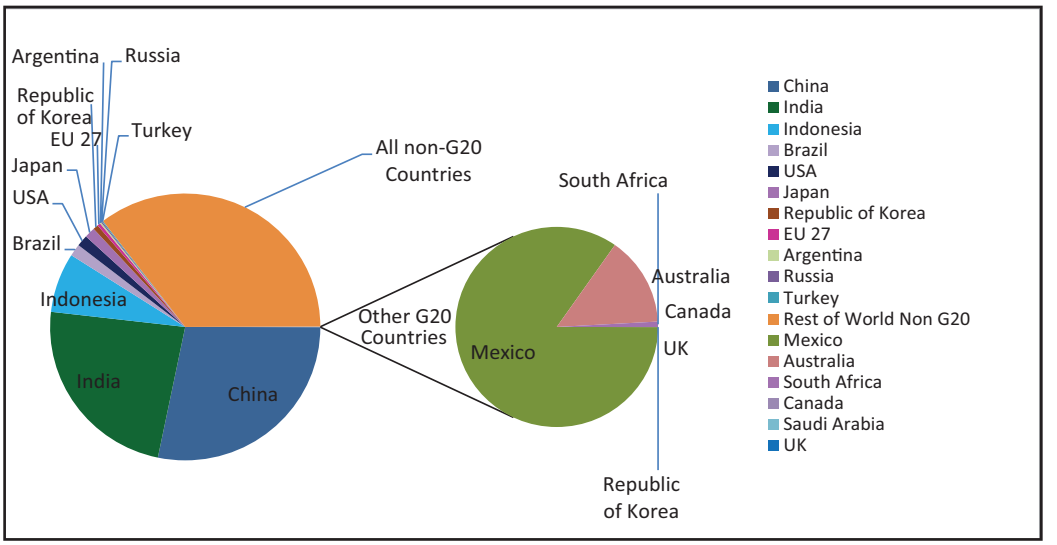


Source: Drawn by Authors, based on data from FAOSTAT.

High share of the G20 countries entails upon them to collaborate among them and rest of world to bring out lasting and affordable solution to food security concerns. This needs immediate financial support as loan and humanitarian aid. Strengthening of food systems in the LIFDCs[15], technological investments, promotion of local crops can be some of the channels of support.

Figure 8: G20 Countries in World Rice (equivalent) Production 2020

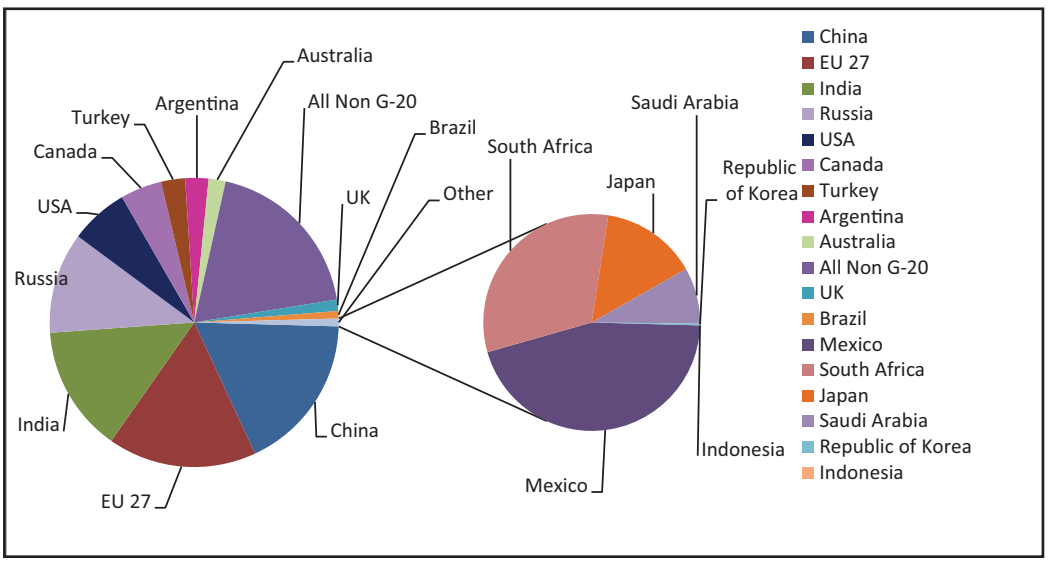
(Million Tonne)



Source: Drawn by Authors, based on data from FAOSTAT.

Figure 9: G20 Countries in World Wheat Production 2020

(Million Tonne)



Source: Drawn by Authors, based on data from FAOSTAT.

G20 in Production of Nutritious Items

In 2020 the share (per cent) of G20 in global production was high (**Figure 10**) in vegetables (excluding roots and tubers) (81), Fruits (66), Tubers and roots (43), pulses (64), and milk (73).[16] On the consumption side the high G20 population, per capita incomes, wealth, trade linkages, logistics make it a major consumer of imports from non-G20 and other G20 countries. Time has come for G20 to support nutritious items and their availability to vulnerable people extending its focus beyond the calorific security.

Public Stockholding from the Food Security Lens

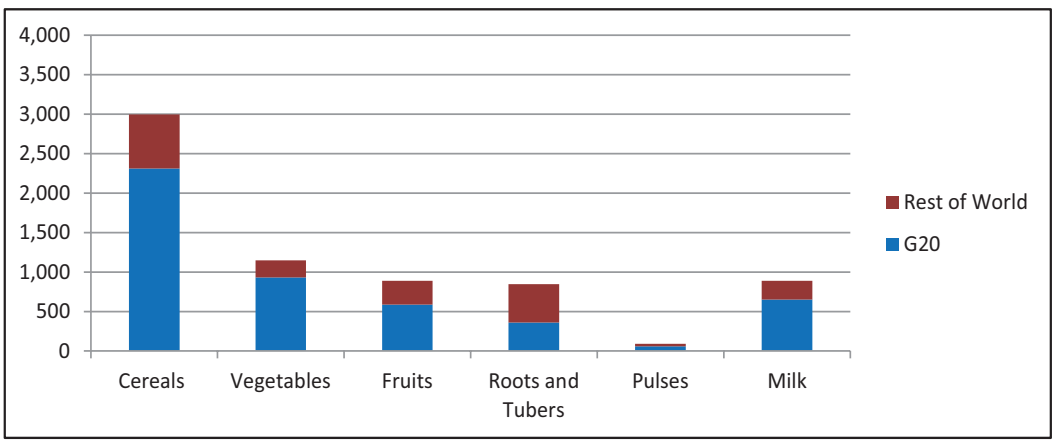
A number of agriculture related issues are under discussions at WTO for years, which to some extent have bearing on food security of many low-income food deficit countries (LIFDCs). These include improving access to agriculture markets, export subsidies, transparency; besides the public stockholding programmes currently under a peace clause since Bali Ministerial deliberations in 2013, and WTO General Council decision in 2014. Food security of LIFDCs should be at the forefront while finalising any solution, all the more as the existing WTO rules cap the subsidy fixed at 1986-88 prices, amidst exports by some developed countries at much below cost. These efforts need to keep matching the ever-changing contours of climate change manifestations, both in the South and the North, deeply intertwined through threads of commonality amidst stressed global public goods.

Emphasis of G7 on Keeping Markets Open

Notably, supporting keeping the markets open, on 7 March 2022 agriculture ministers of G7 in the light of global food security related issues amidst crisis, also endorsed importance of open markets for cereals and other agricultural products. They decided against all restrictive signals and measures that

Figure 10: G20 and Rest of World Production of Food and Nutrition (Select) Items in 2020

(Million Tonne)



Source: Drawn by Authors, based on data from FAOSTAT.

restrict exports and thus lead to further increase in prices. They called upon all countries to keep their food and agricultural markets open and not to tolerate artificially inflated prices, and to fight against all speculative behaviour that endangers food security. They also recalled the institutional arrangements like to strengthen the agriculture market information system (AMIS) to closely monitor agricultural markets, and key outreach initiatives including towards African and Mediterranean countries. These are indeed key concerns to facilitate collaborative efforts towards food security.

World Trade Largely Confined to Wheat, Maize and Milled Rice

In 2020, the world cereal exports were around 492 million tonnes of which wheat and maize occupied the top slots being 40.4 and 39.2 per cent respectively, followed by about 9 and 8 per cent from rice (milled equivalent) and barley. The overall 15 top cereal exporters in 2020 were the USA, Ukraine, Argentina, Russia, Brazil, Canada, France, India, Australia, Germany, Romania, Poland, Hungary, Kazakhstan and Bulgaria. As a trend, the top 15 ranks for the three-year average for 2018 to 2020 were also occupied by these countries except Poland which was at 16th rank against 12th in 2020, whereas Thailand was 12th in the three-year average against 17th rank in 2020. Notably, Russia was second in the three-year average and Ukraine the fourth. In wheat, the five top exporters were Russia, the USA, Canada, France and Ukraine; whereas in maize the USA, Argentina, Brazil, Ukraine and Romania. In rice the five top exporters were India, Vietnam, Thailand, Pakistan and the USA, whereas in barley France, Ukraine, Russia, Australia and Canada. These rankings reveal the enormity of constrained supply lines from Russia and Ukraine, straining food security across many low-income food deficit countries (LIFDCs)[17].

G20 Well Positioned to Steer Food and Nutrition Security

Contributing large shares in cereal and other nutritive items (Figure 10), G20 members can vastly collaborate to initiate and support action towards global food and nutrition security. Equipped with tools created through initiatives during the past presidencies G20 can help significantly at all stages from production to consumption. The Agriculture Market Information System (AMIS), the analytical framework for improving agricultural productivity and sustainability, that includes water-related aspects, the platform on food loss and waste (FLW), the platform for agricultural risk management (PARM), the Group on Earth Observations Global Agricultural Monitoring (GEOGLAM) are some such tools available to harness in synergy and intensely, which can be further strengthened to meet pandemic triggered needs. Financing for emerging technologies and sharing of best agricultural practices, especially inclusive to take small holder farmers, can address new challenges and help in smoother transition to meet climate concerns.

Way Forward

Global food and nutrition security framework should encompass sustainable and inclusive agricultural practices, crop diversification, efficient value chains, equitous technological access, biodiversity protection, trade facilitation; all geared up towards climate

mitigation and adaptation. G20 should collaborate on these aspects to address the ongoing existential climate crisis.

In addition to sharing technology across the entire food value chain, good practices can be exchanged across global north and south, and triangularly, as the transitional phase to address mitigation and adaptation entails flexibility in solutions. On the technology sharing, till substantive progress is made on TFM, fast diffusing food and nutrition security enhancing technologies should be deeply collaborated. Nano technology, supported by digital technology across the entire food value chain and intelligent food item labeling, bar coding and so on can be much helpful given that the food loss saved is equivalent to food grown.

G20 can facilitate the LIFDCs better to access technology and finance to enhance their production of food grains and nutritious items to reduce excessive import dependence, as supply lines from food exporters are prone to clogging due to factors like pandemic, conflict or excessive domestic demand spiraling up. In this endeavour they need to diversify cereal production by promoting millets to some extent as per local suitability of agronomic conditions; as these are more nutritious, have favourably low glycemic index suiting diabetic consumers, meet the needs of low gluten consumers, and also have high iron, zinc and dietary fibre. Further, production of millets requires lower quantities of chemical fertilisers, water, and can adapt to impact of adverse climatic events.

Multisectoral role of G20 needs to be enhanced on the nutrition aspect. Technology for preservation of biodiversity, through both discovered and yet to be discovered genetic resources, improvement of seed quality, storage and optimum utilisation after saving for any eventuality say, a major widespread shock, necessitates global collaboration steered from G20 platform. G20 should give a fillip to the current inadequacy by creation of an institutional arrangement on adequate nutrition by creating a permanent institution with one of the UN bodies.

The food grain stocks of larger G20 and other players and importers also need to be suitably enhanced to meet requirements of higher number of months, towards which the WTO stockholding restrictions, currently under the peace clause, can be permanently waived in the interest of global food security.

The agriculture market information system (AMIS) should be timely populated with information including comprehensive analysis starting preceding agriculture years' unmet demand, excess/ short supply, stocks, trade and market restriction, net and gross cropped areas, pricing trends, extreme events, inputs including seeds, fertilisers, irrigation and rainfall situation, price/ income/ population rise elasticities of demand and supply, and current agriculture year's sowing and so on for all major crops.

G20 should strengthen facilities like 'Desert Locust Response Dashboard' of FAO to save the affected countries, including many LIFDCs of Sub-Saharan Africa from this menace and help in their food security. Further, advance preparations, including arrangements for pesticides, along with adequate protective gadgets for humans, spray equipments, logistics to move within the little time that locust provides, are the key aspects on which global to local synergetic action can prove its efficacy. All the more when many of these countries are having

high population growth and significant income growth, besides expanding value chains, resultantly pushing up demands, to meet it they need better support to harness strengths of their small farmers.

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3. FAO, 'Crop Prospects and Food Situation', Quarterly Global Report, March 2022 pp 1.
4. FAO, 'Crop Prospects and Food Situation', Quarterly Global Report, July 2022 pp 1.
5. Production is shown on the primary axix, whereas agriculture year end stocks and trade on the secondary axis.
6. Here, internalising end-use, milled rice equivalent of paddy is used.
7. http://www.fao.org/3/w1808e/w1808e0c.htm
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13. UN Population Prospects, https://population.un.org/wpp/ last accessed th June 2022 .
14. With respective contributions to global basket in approximate per cent terms as shown in brackets.
15. The inclusion of a country in the low-income food-deficit countries (LIFDCs) group is based on three criteria: 1) the level of the annual per capita Gross National Income (GNI); 2) the net food trade position; and 3) self-exclusion (when countries that meet the first two criteria request to be excluded from the category),. FAO Global Food Prospects, July 2022, pp 10.
16. Figures in brackets are per cent of global production.
17. Authors' analysis based on FAO food trade data over years.

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Research Article

Digital Transformation of Agri-Food System: Policy Pathways for Greater Socio-Economic Inclusion, Sustainability, and International Cooperation

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Abstract: Digital transformation provides opportunities for agri-food systems to monitor and manage global soil, climatic and genetic resources; address pervasive information asymmetries among the stakeholders along the agri-food value chains. It serves as a foundation for a more efficient, equitable, and environmentally sustainable economic development including urban, peri-urban agriculture, and rural growth. However, challenges to maximising the intended benefits and lowering the costs of organising the transformations for equitable access by all stakeholders require innovative policy and strategic approaches. This paper investigates the extent to which policy pathways can accelerate the inclusive digital transformation that can also address the potential risks of the digital divide, highlighting the need for improved inter- and intra-ministerial coordination and global governance architecture.

Introduction

Digital technologies - such as precision farming, sensor-based traceability system, block-chain networks, e-commerce platforms, and fintech services are rapidly transforming the agri-food systems by overcoming the long-standing costs of production, distribution,

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(A different version of this paper has appeared as Policy Brief T20 Indonesia)

processing, marketing, and information asymmetries. In advanced economies of the G20, digital technologies are used to improve the monitoring, cataloging, and dissemination of data to ensure that agriculture and food production services are delivered with a small environmental footprint (Anbumozhi *et al.*, 2021). This is not the case, however, with the developing countries. They tend to have different (lower) capacity and capability to access digital information and communication technologies. To address this issue requires investment in assets such as devices and software as a part of an attempt to reduce digital divide between and within countries. In the absence of such investments, digital inequality can be exacerbated by reinforcing the same spatial, social, and economic divides as in the previous agricultural revolutions.

Despite technological advancement, small farm households, women, and young entrepreneurs in many developing countries continue to face limited access to better knowledge, farm equipment, trainings, and many other constraints in adopting and implementing digital technologies. Moreover, the implementation of emerging digital technologies requires access to mobile networks and internet services. While almost two-thirds of the global population is connected to the internet, the quality, reliability, and costs of internet access differ significantlyamong and within countries. Implications of such unequal access to digital technology should be carefully assessed, analyzed, and addressed given their possible effect on digital poverty and inequalities, which can further contribute to the developmental gaps (Mondejar *et al.*, 2021).

Moreover, in many G20 countries, policy coordination remains a challenge. Digital agriculture policies emanate from multiple institutions and entities and were put in place over time across different jurisdictions ranging from the executive, legislative, and banking authorities, and with varied commodity focus (Indonesian Ministry of Trade, 2021). Such policy silos create inefficiencies and high transaction costs for organizations, businesses, and individuals to operate and invest in digital technologies, hence, limiting innovations for their application in food systems (OECD, 2020).

Emerging global experiences suggest the development and ownership of digital technologies and data platforms can lead to a concentration of knowledge, power, and revenue. Such concentration on a few technology actors and first movers can perversely accelerate the digital divide within and across the countries. Further, a lack of transparency around issues such as data ownership and privacy, for instance, contributes to farm producers' reluctance to share data (Wiseman *et al.*, 2019).

Digital transformation to achieve sustainable development goals (SDGs) is fraught with challenges at the global level. Opportunities to harmonize digital transformation strategies that support SDGs, across the countries, and share international experiences are evident but international progress on this front remains sub-optimal. Digital information and technology services typically involve high upfront costs but nearly zero cost to replicate (World Bank, 2016).Sharing best practices and mutual learning from other countries will reduce externalities and market failures whereby significant gaps exist between public and private benefits (Anbumozhi *et al.*, 2021).

The proliferation of bilateral and regional trade agreements and increased interconnectedness of economies through global food value chains also means that the success of the digital transformation is not only determined by domestic regulatory frameworks but also by international governance architecture (OECD, 2020). Data security, standards for digital technologies, intellectual property rights, and lack of benchmarks have increasingly become a challenge for steering digital agri-food systems to deliver the benefits of food security and sustainability.

Areas of Digital Transformation

For digital technologies to optimally enhance production efficiency, equity, and environmental sustainability in the agri-food systems, the private sector and public sector need to work with the farming community to create thriving digital eco-systems. Creating an enabling environment for digital transformation along the food value chains requires a variety of policy actions at territory, agriculture sector, cross-sectoral and global levels to be put in place. Strategic public policy interventions and investments are listed below.

Sustainable, Inclusive and Equitable Digital Transformation

G20 should develop a concrete and concerted strategy to encourage its members to invest more in digital infrastructure and help other countries do the same with the aim of bridging the divide in access to digital technologies. Such a strategy will help initiate and strengthen institutional mechanisms across countries and regions to ensure that the digital transformation of the agricultural sector leads to an inclusive, sustainable, and equitable ecosystem while at the same time leveraging digital technologies for greater productivity, efficiency, and safety. Following the strategy, the G20 should develop an action plan for sustainable, inclusive, and equitable digital transformation of agriculture, which would lead to developing mutually agreed institutional mechanisms and protocols. This would be an *Action Plan for* Sustainable, Inclusive, and Equitable Digital Transformation of Agriculture, that aims to create a tiered institutional structure. Such an Action Plan would comprise the Tier-1, Tier-2 and Tier-3 enablers, and modalities required to implement the Plan such as capacity building programs, skill development, funding, and international and regional cooperation. It could also leverage innovative public-private- community partnership models and microfinance solutions to support small farmers as well as Micro, Small and Medium-Sized Enterprises.

The role of digital technologies within the agricultural sector has been gaining traction, more so, in the form of Digital Agriculture and Precision Agriculture. As recognized well in the previous G20 declarations, digital technologies can help make food systems more efficient with potential benefits including increased productivity, increased cost-efficacy, and greater access to market opportunities, by leveraging them in both upstream and downstream activities appropriately within the food value chains, such as trade and commerce. In these activities, digital technologies like fintech, e-commerce and blockchain, have already been used, but mostly by those who could have the skills and resources to acquire and adopt them. Therefore, in addition to efficiency

and cost-effectiveness, it is important to develop an institutional mechanism to make the transformation inclusive, sustainable, and equitable as well. A policy response mechanism at the national level within G20 should be structured along the pathways of ensuring the enabling environment for digital transformation to maximize the production efficiency gains and influencing the incentives and decisions of other key stakeholders including the private sector with the goal of maximizing equity and sustainability.

Given the inherent challenges within the developing countries such as having deficient technological and digital infrastructure, inadequate access to internet and electricity, poor digital literacy, and fragmented informal value chains, the task of enabling sustainable, inclusive, and equitable digital transformation in the agricultural sector is not going to be easy. Additionally, digital transformations would entail high upfront and operating costs in addition to the well-established digital physical infrastructure. Lack of regulation and governance mechanisms in the developing countries around digital technologies, e.g. blockchain and fintech as well as interoperability, data protection, privacy, and usage issues act as additional challengesfor the developing countries.

Finally, as part of developing an institutional mechanism of the Action Plan, G20 should support the setting up of a Digital Agriculture Dashboard, which would map the state of digital readiness within the agricultural sector and among the various stakeholders, such as farmers (big as well as small/marginal farmers), enterprises (large as well as Micro, Small and Medium Sized Enterprises), extension service providers, regulators, and consumers. Such a mapping exercise would gather data including that on the Agriculture Digitalization Index (both Tier-1 and Tier-2 Enablers) (as prescribed by Schroeder et al., 2021) as well as data on the digitalization of Agri-Food Value Chain across the countries, enterprises, and farmers. Such a Dashboard would greatly help in assessing the gaps, barriers, and challenges, thus leading to the shaping of an inclusive, sustainable, and equitable digital transformation of the agriculture sector. In addition to the proposed Digital Agriculture Dashboard, an interactive platform comprising of representatives from agriculture, Science and Technology (technology providers), finance (digital payment gateways), trade and commerce (e-commerce), from across the national, regional as well as multilateral forums, can be set up for providing continuous technical, financial, and regulatory assistance and guidance to the stakeholders. Such a tiered approach would help the G20 in setting up a concerted strategy to encourage its members to invest more in digital infrastructure and help other countries do the same to bridge the divide in access to digital technologies.

National and Institutional Capacity Building

Building national capacity to develop national policies and strategies on digital technology for the transformation of the agri-food systems is primarily the responsibility of country governments. However, G20 should support and give a priority for the development of such capacity building by, among other things, helping to identify digital capacity building programs necessary for the transformation of agri-food systems. Developing technological and

human capacity of national ministries of agriculture, for example, influences the extent of change they can bring to foster the digital transformation of the farming community. Having the right skills and capacities is pivotal to designing digital transformation strategies and effectively implementing them for enhancement of productivity, inclusivity, and sustainability.

Following capacity strengthening of digital technology policy and strategy, G20 should support the development of strategic approaches to institutional capacity building to improve the role and function of agricultural research, extension, and cooperative organizations in digital technology transformation. For example, organizing and institutionalising human resources' activities through production and service cooperatives are appropriate solutions for agricultural and social development (Zhang *et al.*, 2020). Literature underlines the positive roles of agricultural cooperatives in sustainable rural employment (Feisali & Niknami, 2021), linking smallholder farmers with markets and mobilising local resources through collective participation (Brandão & Breitenbach, 2019); exhibiting greater levels of cooperation amongst cooperative members (Tremblay *et al.*, 2019); leveraging collective management of the agricultural region and establishing horizontal coordination to influence and control other stakeholders (Hannachi *et al.*, 2020).

In the digital transformation era, building better farmer institutional capacity is a necessary effort to bring agricultural digitalization into food production systems, especially for smallholders. Digital agriculture is portrayed as having the potential: to enhance the productive capacity in cost- and labor-efficient ways (Lioutas *et al.*, 2021); to be more consistent, time and resources efficient, and easier to share information (United Nations, 2017).

The application of digital agriculture promises to unlock productivity by overcoming asymmetric information, to reduce market inefficiencies and risks through information-based knowledge, extension services, and innovation in supply chain management (Kieti *et al.*, 2022). Furthermore, digital technologies in agriculture create greater transparency to enhance competitiveness, to increase production capacity, and to improve farmers' "negotiation power in global value chains" (Kos & Kloppenburg, 2019). Specifically, the application of proper Information and Communication Technologies (IICT) for digital agriculture could overcome the digital divide in targeted smallholder farmers by providing accessible and usable applications adjusted to their needs (Herdon, *et al.*, 2015).

Nevertheless agricultural digitalization is also argued to have externalities in technological costs and risks (Lioutas *et al.*, 2021). To suit changing environmental conditions, an organization can make some adjustments based on potential changes and learning pathways to cope with negative externalities of digitalization. Therefore, an institutional capacity building program is necessary because it would provide an adaptive learning process (Charatsari *et al.*, 2020) and an opportunity for smallholders to get collective access to digital technologies. The program will improve top managers' and smallholders' capacity to tap into digital innovations. Smallholders' involvement will lead to valuable social learning and capacity building (Ingram *et al.*, 2022).

Having a strong digital capacity as part of the output from institutional capacity building enables reduction of the digital divide for smallholders. Most smallholders could afford to buy the devices; however, they experience a lack of digital operational skills, limited technological infrastructure, low discoverability of digital ecosystems, and underutilization due to data privacy (Kieti *et al.*, 2022). Hence, modernizing the extension service or advisory and technical support from the public and private sectors is crucial for digital skills enhancement among smallholders. This could be presented, for instance, as e-government in providing more accessible public information, e.g., weather updates, digital financial literacy, digital technology literacy, etc. To support this, G20 could facilitate a forum for sharing knowledge and best practices among members on the application of digital technology in agriculture.

A strong digital capacity of farmer organizations enables smallholders' risk profiling to minimise the operating costs and risks of financial technology. This would provide inclusiveness to get an access to financial sources digitally so that smallholders could have greater sources of capital for modernizing agricultural inputs to increase farm production (Blekking *et al.*, 2021; Syukur, 2020). To obtain know-how in accessing digital financial technology, there is a need to enhance smallholders' attitude toward the use of ICTs through modern extension services in providing digital literacy and technical assistance. Low level of engagement in ICTs is argued to be a reason for the existence of digital divide, peculiarly in rural areas (Bowen & Morris, 2019). G20 could facilitate the exchange of capacity building program among member countries, targeted not only for farmers' organization but also for the government that will provide the facilitation of modern extension services.

Lastly, institutional capacity building for farmer organisations should involve women and youth participation, particularly in high value markets (Ola & Menapace, 2020). The Covid-19 pandemic has induced uptake of digital technologies bringing numerous chances for added value of agricultural digitalization. The benefits of digital technology can motivate and attract women and youth to contribute by maximising the farm's productivity and enhancing product quality (Abbasi et al., 2022). It would facilitate tailoring policy instruments to a specific agricultural problem, such as concerning women and youth, which then will increase efficiency and effectiveness of agricultural policy by Ministry of Agriculture (Ehlers et al., 2021). Moreover, this solution corresponds with the Broadband Commission's policy recommendation to incorporate gender in national broadband plans and strategies and to advance gender equality in implementation. The role of G20 in the focus solution on women and youth could be to facilitate mentoring for bilateral cooperation to support the inclusion of digital agriculture among members. For instance, G20 could initiate building professional networks with two types of countries: the one that has better experiences in engaging women and youth to apply digitalization in agriculture sector; and the one that is lagging behind.

Above all, the main role of G20 in addressing digital divide should involve preventing the big data divide in digital

agriculture by promoting the free flow of data at the country level. Experience from Canadian government to incentivise digitization for many actors of food systems including corporate entities and farmers to rebalance power of using innovation (Bronson and Knezevic, 2019) could provide a good insight for G20 members.

Data-Sustainability - Innovation Nexus Approach

G20 has a role to play in developing framework that enables data sharing across sectors to address food security and nutrition issues as well as developing climate resilient food and agricultural systems. Such a framework should be able to bring all actors and players in the digital technology world, including the private sector that should be incentivised to allow using their data for public policy and research, while respecting data privacy concerns.

Data is the fuel that drives the digital transformation. Developers of digital innovations in agri-food systems are dependent on access to high quality data and internet networks to maximize sustainability gains. The G20 countries should consider "the data-sustainability-innovation nexus" to prioritise and act on cross-sectoral policy themes and mobilise public investment and resources towards improving digital agriculture. This recommendation is proposed by taking into account lessons from approaches to sustainable development goals (Boas *et al.*, 2016) and water, food, and energy issues (Biggs *et al.*, 2015; Faeth and Hanson, 2016) in tackling cross-sectoral challenges. The nexus approach provides an impetus to raise awareness of the message that policy domains related to agricultural digital transformation are intertwined. Digital agriculture interventions are not panacea and need to be supported by investments in other sectors such as infrastructure, telecommunication, energy, etc. The nexus approach presents economies of scale and scope, hence benefitting policymakers from lower transaction costs.

The proposed nexus focuses on three areas, i.e. data, sustainability, and innovation which were derived from a review of policy discourse and the literature. Previous studies highlight connectivity, transparency, and data governance (Ehlers *et al.*, 2021; Fielke *et al.*, 2020; Weersinket al., 2018); sustainable development, financial inclusion, climate change, and the environment (Lindblom *et al.*, 2017; Mondejar *et al.*, 2021; Weersink *et al.*, 2018) as key themes in digital agriculture. Meanwhile, the G20 Agriculture Ministers' Meeting communique in 2021 underlined "the importance of digital transformation in agriculture, fostering innovation while protecting data privacy, data security, intellectual property rights, investment in research and development in research and development (R&D) and knowledge transfer to farmers" highlighting other areas of concerns.

The nexus, therefore, represents three policy themes, viz: i) data governance (including issues such as data privacy, transparency, data domains, etc.); ii) sustainability and inclusiveness; and iii) innovation enablers (including infrastructure, taxation, finance, competition, cross-sectoral R&D, etc.). Their trade-offs, cross-sectoral implications, policy domains, and decision-making should be assessed in the initial stage of the nexus approach adoption. Data, for instance, are

a key input for innovation. Yet, the lack of transparency regarding data sharing may hinder stakeholders along the agri-food value chain to adopt innovation.

Since key interventions required for nexus approach lies outside the competencies of agriculture ministry, a cross-sectoral strategy is warranted. Policies and public expenditure of cross-sectoral actions need to ensure that digital transformation does not create or add to existing inequalities. Governments can also support access to finance for local entrepreneurs who develop green digital technologies. Although various opportunities exist to finance climate friendly technologies, entrepreneurs in developing countries have little knowledge of them. First, the G20 should focus on raising countries' awareness of the cross-sectoral policy themes and the nexus approach. At the minimum, the G20 should encourage the sharing of best practices between G20 countries to address the data- sustainability-innovation nexus and cross-sectoral policy themes at the national level. Once support is gained from its member countries, the G20 should also incorporate specific targets for establishing public or stakeholder led data platforms or G20 level data cooperative, to ensure continued progress towards addressing cross-sectoral policy coordination. At the national level, a relevant example of the institutional arrangement is the Agricultural Innovation Australia (AIA), which is a not-for-profit, public company established in 2020 to facilitate joint investment and collaboration in cross-industry issues along agriculture, fisheries, and forestry value chains. The AIA attracts investment from public, private, not-for-profit, and global commercial entities and recognises the need to shift investment towards cross-sectoral outcomes (DAWE, 2022). In Japan, an agricultural data collaboration platform call WAGRI was established in 2017. WAGRI provides useful data and facilitates data sharing across the stakeholders and sectors. The G20 should also support non-G20 countries to develop a national strategy for digital food and agriculture, for example, by using frameworks such as the FAO and ITU's e-agriculture strategy that incorporates other relevant sectors such as the banking and ICT sectors (FAO & ITU 2017).

Secondly, at the G20 level, efforts should be directed toward bringing the data-sustainability- innovation nexus into the limelight of global institutions. The water-energy-food nexus, for instance, gained traction since the report by the World Economic Forum (WEF) and the Bonn conference in 2011. Since then, the water-energy-food nexus concept has stimulated policy, research, and international development programs as well as financial decisions. In practice, there are three aspects critical to act on this recommendation. First, having a concept report developed through a multi-stakeholder consultation process is critical for the reviewing of cross-sectoral policy themes and inter-linkages between them. Secondly, a close coordination with other international institutions such as the FAO, the World Bank, and various development and knowledge partners is critical. Thirdly, the nexus approach will also require coordination between the G20 Agriculture working group and other working groups such as Digital Economy; Environment and Climate Sustainability; Development; Trade, Industry, and Investment; among others. Strategies captured in the proposed

concept note should be implemented into respective working groups' agenda and a dedicated inter-working group platform should be organised to allow regular monitoring of each working group's progress.

International Governance Structure

The high-tech data-heavy character of the digital revolution in agriculture that has the potential to comprehensively solve production challenges has also raised concerns over issues of sustainability, monopoly of technology providers, data privacy, and national sovereignty (Bronson and Knezeic, 2016: Carolan, 2017 and Wolfert et al., 2017). So, an important role for G20 policy makers is to put in place a legal, regulatory, and governance framework to address the negative consequences and risks associated with digital technology.

According to World Bank's Enabling the Business of Agriculture (EBA) report, countries with high quality information and communication technology regulations tend to also perform well on GSMA mobile connectivity Index (World Bank, 2017). In contrast, arbitrary regulatory changes and lack of coordinated trade and investment policies create high transaction costs and drive up prices for end users (Samarjiva & Zainudeen, 2010). To ensure a wider use of secured data, it is essential for data to be shared on large platforms governed jointly by the public and private sectors grounded on the principles of transparency. Incompatibility of digital technologies and related softwares across countries could create information asymmetries among big technology companies, small agribusinesses, and farmers.

The risk of power imbalances and losing the bargaining power of farmers depend on whether digital agriculture solutions are based on closed proprietary systems or open flexible systems (Wolfert *et al.*, 2017). Self-regulation and standards set by industry would help to address these challenges. So far industry self-regulation by developing common standards has kept this challenge in check. For tractors and farm equipment, the ISO BUS standard and for precision farming, the Agri Net Standard has been established. As in the software industry, regulations may be required for big agricultural tech companies to make their software and data processing system compatible with farm management systems so that farmers can use their existing hardware and software. Similarly, G20 governments could encourage interoperability between mobile phone operators and financial institutions to improve the financial inclusion of smallholder farmers. Interoperability is the ability of digital money operators to connect with each other and with the banking system. For smallholder farmers, this means they can send and receive money through mobile networks in real-time.

Agricultural policy support should also incentivise farmers to adopt digital technologies that bring environmental benefits. This could be done by repurposing distortive support toward digital technologies with environmental co-benefits. For instance, renting precision agricultural equipment through digital platforms has a lower carbon footprint than buying (Anbumozhi *et al.*, 2021). However, some regulations may discourage farmers from benefitting from digital solutions. For example, data security regulations and the cumbersome

licensing procedure often prevent the potential benefits of digital technologies from reaching farmers.

To realise the overarching opportunities to accelerate digital technology transformation process in agriculture that also contribute towards achieving Sustainable Development Goals (SDG), new governance models such as sandbox regulations and platforms models ought to be explored at the G20 level. G20's Financial Stability Board founded in 2009 can be considered as a model to facilitate that kind of global coordination. The rationale for and relevance of proposed mechanisms such as the Sustainable technology Board (STB) (Stephenson et al., 2021) and the Digital Stability Board (DSB) (Fay & Medhora, 2021) should be considered in support of the G20 Agriculture Cooperation framework. The current global food price inflation crisis emerging from the Ukraine-Russian war and the Covid-19 pandemic recovery plans could be an opportunity to revisit these proposals and their implementation.

In order to realise the key SDGs such as food security, climate change, and biodiversity preservation, from the implementation perspective, the G20 Agriculture Working Group must take into account other ongoing global initiatives such as the UN World Summit on the Information Society (WSIS), the e-Agriculture Community of Practice (CoP), the International Telecommunication Union (ITU) and its Global Symposium for Regulators, the World Bank's Digital Development Partnership (DDP), the OECD Going Digital Project, in addition to G20 Meeting of Agriculture Chief Scientists (G20-MACS).

The G20 should also identify and promote essential safeguards to ensure sustainable digital agriculture and minimize unintended consequences (e.g. developing international standards and regulations). The International Platform for Digital and Food Agriculture being proposed as a multi-stakeholder forum (FAO, 2020) could be supported by G20 Agricultural Working Group, to shape international digital agriculture and data sharing policy. This enhanced platform will develop synergies by closely working with and receiving guiding principles from the G20 Working Groups on agricultural, digital economy, trade and investment, and the 2030 agenda. This could be seen as a strategic approach to maximise the potential benefits of digitalization of agri-food systems and fostering a coherent, inclusive, and sustainable global governance architecture toguide the transformation.

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Research Article

G20 Support for Improved Infrastructure Project Cycles in Africa

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Abstract: New African-led infrastructure models are needed to support Africa's economic transformation. G20 including the Compact with Africa (CwA) initiative should support implementation of such models. In particular, financing for infrastructure is slow and cumbersome with traditional partners. While non-traditional financiers provide faster response times, projects may also suffer in areas of quality and governance. We recommend that the Programme for Infrastructure Development in Africa (PIDA) Quality Label be applied for wider use; and development of a learning platform that federates fragmented capacity building initiatives for infrastructure, establishes a community of practice of African infrastructure experts and provides a forum for regional/global peer learning.

Introduction

Infrastructure gap in Africa is estimated at US$130 and US$170 billion per year, while 80 per cent of infrastructure projects fail at the feasibility and business-plan stage (McKinsey, 2020) (see Figure 1). It can take several decades for an infrastructure project to be completed, but with 28 African countries having doubled their population in the 25 years between 1990 and 2015, the United Nations (UN) projects that another 26 countries will double their population between 2017 and 2050 (UNDESA, 2019). Urban population is projected to increase from 472 million or 40 per cent of the total in 2015 to 1.3 billion or 56 per cent in 2050. By that time there will be some 120 African cities of more than one million

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people. Without high quality and green infrastructure developed more quickly, Africa's economic transformation will lag, economic growth will be stifled, and the opportunities of integration will be missed.

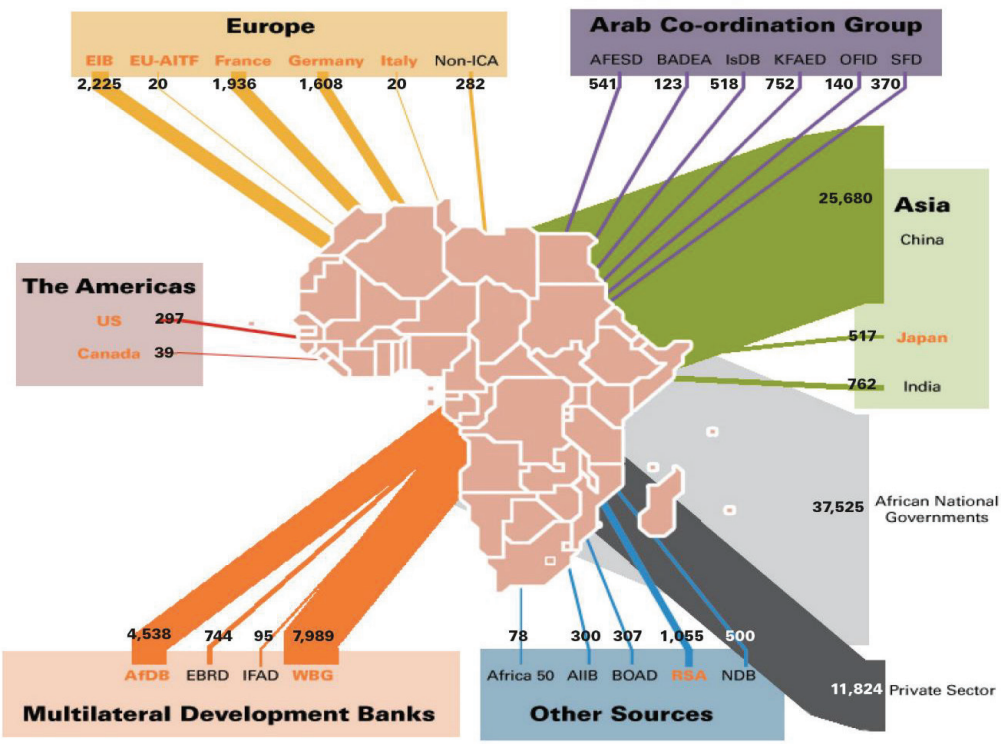
Literature has identified a wide range of bottlenecks to reducing project times while retaining quality (OECD, ACET. 2020). These include, for example, institutional capacity constraints and varying standards, constrained access to finance and development partner requirements, changing political priorities, unsatisfactory feasibility studies, inefficient procurement process, complex regulatory frameworks, negotiation complications, sub-contractor performance, and lack of risk mitigation tools.

Need for Improving Project Cycles

Current upstream processes are not generating pipelines of "ready to go" quality infrastructure projects. Moreover, in the context of the African Continental Free Trade Area Agreement (AfCFTA), adequate commitment between countries and institutions, and financing mechanisms are missing for the creation of cross-border infrastructure, which is essential in a large continent with many landlocked countries. Fundamentally, slow project development processes cannot match the dynamics of demographic shifts, digital technologies, global value chains, a rising middle class and urbanization.

New demographic dynamics are now playing out in Africa, including new

Figure 1: Infrastructure Financing Trends in Africa



Source: Drawn by Authors based on data from various sources.

patterns of agglomeration, changing the spatial geography of the continent and its degree of urban density (OECD/SWAC, 2020; AfDB/OECD/UNDP, 2016). The United Nations estimates that the continent's population will nearly double from 1.3 billion in 2019 to 2.4 billion in 2050. The vast share of this growth will be in sub-Saharan African countries (UNDESA, 2019). At the same time, infrastructure of the future must respond to climate change, new economic landscapes with high value-added manufacturing, cross border trade and global exports.

Moreover, the African infrastructure financing landscape is changing rapidly. Before the Covid-19 pandemic, according to the Infrastructure Consortium for Africa (ICA), Chinese financing for African infrastructure has been running at levels comparable to, or higher than, financing from all G7 members and multilateral development banks (MDBs) combined (ICA, 2019). There are already numerous programs of support to Africa focused on infrastructure. These include the aforementioned PIDA, significant lending programs from MDBs and development finance institutions (DFIs), the G20 Compact with Africa, the European Union (EU) External Investment Plan, the Belt and Road Initiative, Asia-Africa Growth Corridor, the Forum on China-Africa Cooperation Beijing Action Plan, the Yokohama Plan of Actions 2019, Organisation for Economic Co-operation and Development (OECD) principles and guidance on infrastructure financing, as well as infrastructure related working groups within the G7, G20, and the United Nations. In addition to PIDA and ICA, within Africa there are institutions such as the Africa Finance Corporation; advocacy organizations such as the AU Continental Business Network; investment events such as the Africa Investment Forum; industry groups such as the Africa Infrastructure Development Association. Globally institutions such as the Global Infrastructure Hub and the Global Infrastructure Facility also provide critical support.

But even with this rich ecosystem to support scaling up infrastructure in Africa, gaps remain, to include the need for expanding the PIDA quality label, and providing a dedicated platform for African infrastructure practitioners to learn from each other and from global experience. There is an abundance of good practices including many that arise from learning by doing in Africa that can inform initiatives and programs to fill these gaps.

This problem can be addressed by expanding the use of the PIDA quality label, and improving learning and knowledge exchange among African infrastructure practitioners. The challenges also require crowding in global best practice and experiences.

Wider Use of PIDA Level

G20 support is needed to expand the PIDA quality label. As part of the PIDA Service Delivery Mechanism (SDM), the PIDA Quality Label is a recognition by the African Union Development Agency (AUDA-NEPAD) awarded to projects that excel in the preparation of PIDA projects at an early stage. Its overall goal it to unlock critical bottlenecks in project development. The objectives are to shorten the project period to reach the feasibility and bankability stages; to identify project preparation gaps and help access project preparation facilities (PPFs); and to certify excellence in project preparation with a label recognized

by stakeholders. G20 countries and institutions and the G20 Compact with Africa should systematically support promoting the wider use of African Union (AU)-endorsed Programme for Infrastructure Development Project Quality Label (PQL), and to support promotion of the PIDA Quality Label as an African brand for excellence in infrastructure development processes that can serve to accelerate project pipelines across the continent.

The mechanism helps Regional Economic Communities (RECs) and AU Member States structure project information, particularly in submitting applications to PPFs. This is important in order to obtain funding to carry out technical studies, as well as help the project owner to establish bankable projects and reach financial close. It is intended for DFIs and other financing partners to use PQL as a screening and appraisal tool to fast track early-stage advisory. This African model is currently applied to projects emerging from the PIDA 2021-30 selection process. The aim is to build in regional and sectorial linkages, with a rigorous analysis in terms of markets and investments, so that projects selected for PIDA are implementable rather than remaining aspirational.

To implement an expansion of the quality label, for example it could be applied to more public-private partnerships (PPPs). PPPs usually take up a small share of total infrastructure projects in many developing countries, and in PIDA's first phase they are estimated to be only 7-11 per cent of the total number of PIDA projects. The quality label could also be applied to the majority of infrastructure projects that are carried out through public procurement. Additionally, although project preparation is a key stage that delays infrastructure development particularly in PPPs, there are major bottlenecks in other stages of procurement, resettlement, construction, and operation and maintenance that need to be removed. The mechanism could also include facilitating the necessary decentralization of project cycle management to sub-national levels in Africa. Finally, the quality label could be applied to programs for corridors and regional connectivity with multi-sectoral sub-projects.

G20 countries and their institutions and initiatives (such as the Compact with Africa) should both indicate their support for an expansion of the quality label, and provide either direct technical support, or advocate for MDBs and international financial institutions (IFIs) to provide such support. Likewise, G20 countries should encourage development finance institutions to assess investment and financial additionality to projects under an expanded PIDA quality label. Expansion of the quality label would be undertaken directly by the PIDA Secretariat at AUDA-NEPAD, as per existing institutional arrangements.

Infrastructure Learning Platform

G20 countries and institutions and the G20 Compact with Africa should lend support to a community of practice of African infrastructure practitioners and the planned African Infrastructure Learning Platform. This is Africa-led infrastructure knowledge and peer learning platform and a community of practice of African infrastructure practitioners that works to speed up the building of capabilities of infrastructure professionals and stakeholders across

Africa. This will include supporting efforts to leverage existing initiatives in Africa and worldwide to meet the immediate needs for capacity building among African infrastructure professionals and identify specific knowledge gaps within the ecosystem. These may relate, for example, to finance and participate in procurement, contractor competence, institutional processes and country systems for socio-environmental protection. Such a platform has been endorsed in the final communique of the sixth PIDA Week in January 2021, and furthermore by the African Union Heads of State.

Forming a multidisciplinary community of African infrastructure professionals is a priority. At this time, it does not exist in a holistic manner, and hence professionals across disciplines do not have a natural "community" and miss out on opportunities for sharing experiences, good practices, and latest innovations. The knowledge aspect of the platform would include new research and analysis, case studies, and comparative studies; as well as existing training courses and online sharing via video materials. In particular, the knowledge platform would crowd in content from the private sector; technical, vocational and training institutes; and international and regional organizations. Topics may include, for example, upstream regulatory issues, project preparation, financial structuring, designing procurement systems, and operations and management.

The peer learning aspect of the platform would provide thematic-based groups of experts to share new research and analysis, explore policy issues over time, and provide recommendations to policymakers. Similarly, the peer learning experiences will include both one-off events, as well as medium and long term engagements and thematic series – and both virtual and in-person engagements. There will be an emphasis on real-time learning across public and private sectors related to ongoing infrastructure projects.

Stakeholders are keenly aware that numerous institutions are already organizing professional groups or running training programs for civil servants and other infrastructure experts. PIDA has its own capacity development program; and the Development and Investment in Infrastructure Conference Series (DII) is an annual conferences on infrastructure development and investment in Africa organised by the University of Zambia, the University of Johannesburg, the Copperbelt University (Zambia) and the National Council of Construction of Zambia. The Africa Infrastructure Development Association (AfIDA) is an association of project developers that fosters dialogue amongst its members, works to standardize project development documentation and serves as a policy advocacy platform for the industry. And the African Capacity Building Foundation (ACBF) provides an array of relevant knowledge products and services.

In establishing Africa-led infrastructure knowledge and peer learning platform and a community of practice of African infrastructure practitioners, organizers will partner with ongoing efforts, fill gaps where appropriate and create linkages among existing program and initiatives. In particular the PIDA Service Delivery Mechanism will remain an anchor initiative to advise infrastructure project stakeholders.

Deepened G20 support within Compact with Africa

G20 support with the Compact with Africa can be strengthened to specifically address project infrastructure cycles as a means to accelerate infrastructure investment. Such activities may include research and analysis, policy advice and technical assistance, investment and finance promotion, and coordination across countries and institutions. It would require G20 members to actively advocate for the quality label and knowledge platform. The Compact with Africa (CwA) is a legacy G20 initiative launched under the German G20 Presidency to promote private investment in Africa, including in infrastructure.

The CwA's primary objective is to increase attractiveness of private investment through substantial improvements of the macro, business and financing frameworks. It brings together reform-minded African countries, international organizations and bilateral partners from G20 and beyond to coordinate country-specific reform agendas, support respective policy measures and advertise investment opportunities to private investors. The initiative is demand-driven and open to all African countries. The CwA is governed through the G20 Africa Advisory Group, co-chaired by Germany and South Africa; and receives implementation support from the African Center for Economic Transformation (ACET). Further, it may also include incentives to CwA members to participate in these initiatives with additional technical assistance from the international financial institutions. Lastly, the G20 Africa Advisory Group (both G20 and CwA members) should encourage further CwA-specific research and analysis on project cycle challenges and to integrate project cycles into overall CwA policy matrices and programming. Such activities may include policy advice and technical assistance, investment and finance promotion, and coordination across countries and institutions.

The G20 has an intrinsic role to play in ensuring that Africa's infrastructure gap is addressed more quickly than in the past, but with quality infrastructure. A significant portion of African infrastructure will be financed and constructed by G20 governments, institutions and corporations hence these recommendations are of high relevance to the G20. Such support will lead to greater growth and economic transformation, therefore lessening pressures of poverty and migration. If done smartly, such infrastructure investment will be climate-smart and cognizant of social, economic and governance issues.

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Research Article

G20 Collaboration for Smooth Transition to 4IR in Developing Countries

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Abstract: Industrial policies shape the ability of a country to export and shape its participation in global trade. The Fourth Industrial Revolution (4IR) has enabled a sudden shift in technology frontiers of countries backed by artificial intelligence (AI), robotics, 3D printing, block chain, big data, machine learning (ML), distributed ledger technology (DLT), etc; hence making production technologies in low-technology or "slow catching-up developing economies" redundant and lowering their exporting prospects. Essentially, the future belongs to an era of managing 4IR than avoiding or delaying it. While the economic dividends offered by such disruptions are potentially huge, cyber security risks, unemployment due to automation, skills gaps, lack of capacity and preparedness could be costly especially for developing nations. This paper identifies the key enablers of this new industrial transition and issues relating to adoption of the 4IR with the possible role of the G20 in steering the 4IR frameworks in the future.

Introduction

The Fourth Industrial Revolution (4IR) is going to define the course of 21st century industrial policy. Advanced digital technologies such as artificial intelligence (AI), 3D printing, robotics, block chain, internet of things (IoT), distributed ledger technology (DLT), machine learning (ML), big data, cloud computing and others are enabling a transition towards the 4IR around the world. The 4IR essentially marks a radical departure from conventional manufacturing to digitalisation of manufacturing; characterised as end-to-end digitalisation. Major industrial economies like the United States, Japan, the European Union, South Korea, etc. are already in the race to reap the "first mover advantage" of the 4IR through formulation of national industrial policies and revamping their institutional and innovation ecosystems. For instance, South Korea made a rapid transition to the 4IR through convergence of automation and data exchange in manufacturing technology. To enable firms to adapt to the digitalisation of manufacturing the Government of

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Korea introduced the Manufacturing Industry Innovation 3.0 Strategy in 2014 as part of the Creative Economy Initiative. Manufacturing 3.0 leveraged the concept of smart factories, which involve fully technology based manufacturing systems connecting the entire production process. The Government of Korea has set a target of 30,000 smart factories by 2022 with support for small and medium enterprises (SMEs) and provision of training to 40,000 skilled workers. As rapid advances in information technology such as 5G, sensors and nanomaterials, etc take place, Korean manufacturing has undergone dramatic transformation in the recent years.

Well in advance, the EU launched the Digital Agenda for Europe in 2010 with the aim of reaping the economic and social benefits of a single digital market among EU members. Among the emerging markets, the BRICS countries (Brazil, Russia, India, China and South Africa) are leading front-runners in 4IR adoption. All the BRICS countries have come up with strategies to fast-track the process of adoption of 4IR technologies. For instance, South Africa launched the National E-Strategy with the aim of establishing the country as a significant player in the development of information and communication technology (ICT) sectors, as well as accelerating the uptake of ICT in the production or delivery of products/services. Similarly, China came up with the "Make in China 2025" initiative with the objective of transforming China into a manufacturing hub by using the technological advances in manufacturing. Similarly, New National Strategy on Industry 4.0, Make in India initiative, and National Technology Initiative were launched in Brazil, India, and Russia respectively. Initiatives on 4IR by BRICS as a grouping assumed traction since the launch of the BRICS Industry Ministers Meeting in 2015 during the Russian presidency and after adoption of the seven-point action plan during the Chinese presidency in 2017.

While individual BRICS economies are embarking on their own national industrial policies, BRICS countries in general are not prominently featuring as frontrunners of innovation in digital production technologies except China (UNIDO, 2020). Although UNIDO's characterisation of "BRICS-Less China" as the follower group on the global technology landscape, the BRICS countries are preparing for fuller adoption of 4IR in their industrial sectors. Moreover, BRICS continued to remain attractive destinations for foreign direct investment. In fact, BRICS countries are gradually converging with the developed countries in adoption of the 4IR in terms of three factors: (i) public initiatives in BRICS countries attracting talent from developed countries to BRICS, (ii) the role of multinationals and (iii) implications of educational institutions. Likewise, all Association of Southeast Asian Nations (ASEAN) countries have introduced a number of initiatives on the 4IR in the form of national digital economy master plans, innovation and entrepreneurship policies. The ASEAN Consolidated Strategy on the 4IR has identified six enablers to support the initiatives across three focus areas including (i) digital infrastructure, (ii) capacity building, (iii) institutions and governance, (iv) cooperation and collaboration, (v) resource mobilisation, and (vi) effective monitoring. ASEAN 4IR Strategy involves 73 ongoing initiatives and

several future initiatives. The ongoing initiatives are in different segments such as technological governance and cybersecurity (13 nos), digital economy (29 nos), digital transformation of society (27 nos), and cross dimension initiatives (4 nos).

Technological transition in developing countries, although robust, is slow due to a multitude of socio-economic, cultural and political reasons. Lack of proper infrastructure, particularly digital infrastructure, in developing countries as well as their failure to successfully upgrade to previous technological revolutions has reduced their ability to cope with the 4IR. In addition, faster adoption of frontier technologies by developed countries is widening the technological gap, making it difficult for less industrialised countries to catch up. The failure to catch up faster with 4IR could be costly for the developing economies and no country can afford to follow the conventional catch-up path as the innovations in digital technologies happen at a much faster pace.

With greater awareness of cross-cutting applications of digital technologies, developing economies are embracing the 4IR with a pinch of salt, if not as a conscious policy choice. Undoubtedly, digitalisation is a transformative force for economic growth and societal progress. However, the fear of job loss, particularly in populous countries like India, South Africa, etc. remains a concern. It is estimated that the 4IR could lead to the displacement of 75 million jobs worldwide in the next four years (Betti and Palamaiu, 2021). Countries in Southern and North Africa with a manufacturing employment share of more than 10 per cent may be vulnerable to a fall in employment share depending on what they produce and whether it is for the home market or for exports (Fox and Signe, 2021).

Additionally, 4IR has raised concerns over the transfer, storage, pricing and usage of such data in view of the threat of monopolisation by private entities. Most importantly, data privacy concerns arising from overlapping harms, e.g. appropriation of a person's picture or name for commercial advantage, surveillance of individual affairs and public disclosure of private facts; data flows in value chains, etc are crucial policy challenges. It is difficult to measure the value and consequences of different uses of data throughout the value chain. Heterogeneous approaches to data with respect to jurisdictions, countries and cultures often bring complexity in addressing the identified harms without any coordinated global policy approach.

Digital Experience during Covid-19, Building Blocks for 4IR Adoption

Covid-19 transformed the world to the businesses, households and governments. Supply chains have been digitalised with numerous micro, small and medium enterprises (MSMEs) getting connected to e-commerce platforms. Had it not been possible, a colossal loss of income, jobs and welfare could not have been avoided. Consumer reliance on digital platforms, despite being born out of necessity over the last two years, is now motivated by choice, indicating the steady accumulation of consumer trust in digital platforms. Companies have changed their operations, marketing and distribution channels marking radical shifts in their business models. As per a survey conducted by Mckinsey,

businesses were able to cut their processing time dramatically during the pandemic, which is not simply a cost-saving exercise but a harbinger of change, (Table 1).

Key Enablers of 4IR Transition

The G20 and the world economy are going to embrace the 4IR in an accelerated fashion in the coming years. The growing spread of digital products and services will make this process irreversible regardless of the development status of the countries. ASEAN in its comprehensive 4IR Strategy has identified six enablers of 4IR for the member countries which are applicable to the larger family of emerging markets and developing economies. Those are: (i) digital infrastructure, (ii) capability development, (iii) cooperation and collaboration, (iv) institutions and governance, (v) resource mobilisation, and (vi) effective monitoring. These enablers correspond to an integrated and mutually reinforcing ecosystem approach which addresses multiple facets of the 4IR transition in developing countries such as digital readiness, enabling digital infrastructure and skilled human resources.

Our assessment of digital readiness in various countries by their income status reveals interesting developments. For mobile and internet indicators, the numbers look impressive for most of the country categories covered in Table 2. According to the International Telecommunication Union (ITU), mobile broadband subscription and the coverage of 3G and LTE mobile networks has increased rapidly across all the groups. Additionally, the international bandwidth has increased incredibly for developed and developing countries.

Table 3 captures the trends in digital readiness in G20 countries. By and large, all countries are catching up faster in digital infrastructure and usage of digital

Table 1: Digitalisation Reduces Transaction Costs

(No. of Days)

Activity	Expected	Actual	Acceleration Factor (Multiple)
Increase in remote working and/or collaboration	454	10.5	43
Increasing customer demand for online purchasing/services	585	21.9	27
Increasing use of advanced technologies in operations	672	26.5	25
Increasing use of advanced technologies in business decision making	635	25.4	25
Changing customer needs/expectations	511	21.3	24
Increasing migration of assets to cloud	547	23.2	24
Changing ownership of last-mile delivery	573	24.4	23
Increase in near-shoring and/or in-sourcing practices	547	26.6	21
Increased spending on data security	449	23.6	19
Build redundancies into supply chain	537	29.6	18

Source: Mckinsey (2020).

services. It forms the backbone of the adoption of the 4IR.

Taking into account the systemic changes happening across the world, the following actions that G20 may consider implementing for smooth and faster adoption of 4IR.

Leaf-Frog, than Just Follow

Developing countries need to make significant progress in upgrading their economies to past technological innovations as well as embrace the 4IR. Given the rapid and disruptive nature of digital technology, no country

Table 2: Mobile and Internet Penetration Growing Rapidly across Countries (Per 100 Inhabitants)

Indicators	World		Developed		Developing		LDCs		LLDCs		SIDS	
	2015	2020	2015	2020	2015	2020	2015	2020	2015	2020	2015	2020
Fixed-telephone subscriptions	14.0	11.6	39.0	33.4	8.9	7.4	0.9	0.8	3.8	3.3	12.1	11.6
Fixed-broadband subscriptions	11.4	15.8	29.5	34.6	7.6	12.1	0.8	1.4	1.9	2.9	6.7	8.0
Mobile-cellular telephone subscriptions	97.3	107.0	124.5	133.0	91.6	101.9	67.5	74.7	70.4	76.7	80.4	84.8
Active mobile-broadband subscriptions	44.6	77.3	89.2	127.1	35.4	67.5	14.9	36.3	19.7	40.0	31.8	54.4
Population covered by at least a 3G mobile network	78.3	93.6	94.0	97.8	75.0	92.8	53.3	79.0	49.8	78.6	61.5	87.8
Population covered by at least an LTE/WiMAX mobile network	43.4	85.0	85.4	98.0	34.7	82.4	15.4	44.1	12.3	41.9	34.9	65.4
International bandwidth (Tbit/s)	154.5	719.1	79.2	263.4	73.8	405.1	0.7	7.6	2.1	9.4	4.5	32.3
Households with Internet access at home (%)	47.9	65.7	80.1	87.8	36.5	57.8	10.7	22.0	20.8	31	..	48.4
Individuals using the Internet (%)	40.5	59.1	76.7	88.3	32.9	53.3	10.8	24.6	19.2	32.3	39.4	60.6

Source: ITU Statistics

particularly developing countries, can afford to follow the traditional catch-up model that has explained previous industrial revolutions. The way to remain relevant today is to 'leap-frog', not in the technology leader-laggard (follower) framework, which is feasible at least for the emerging economies. Countries such as India, South Africa, and Brazil can use leap-frog to catch up with technologically advanced nations and reap the benefits of Industry 4.0. For example, instead of going through various stages of network development that developed countries did, such as analogue to copper and then to fibre optics, developing countries can choose to install fibre optics directly.

Open Source Innovations

Open-source technology can provide a means of effective technology transfer and can help countries to leap-frog, thereby helping them to catch up with their developed counterparts. It supports the production of goods based on publicly shared designs, promote innovation, and help countries to move to higher trajectories. Open-source platforms provide the best circumstances that can ease and aid digital transformation. Apart from being extremely secure any potential security threat could be resolved immediately by the community. Open source is cost-effective as there is no licensing fee, and enterprises using the platform are allowed to innovate on their own if they keep their source code open. It drives innovation, keeps maintenance and development costs low, and provides prolonged utility to the platform.

Various forums have been discussing and promoting the use of open source innovation (Table 4). UNCTAD has been promoting the use of open-source technologies for many years. The Economic and Social Council has adopted a resolution on open source technologies for sustainable development (UNCTAD, 2017). United Nations have undertaken an open source initiative to make technology, software, and intellectual property available to everyone, including developing countries (Karlitschek, 2019). UNICEF has also developed various tools and platforms to operationalize its commitment to open source, including tools to foster open source collaboration, agreements to develop new solutions with vendors and collaboration in the open with UNICEF's partners. UNICEF has worked to progressively operationalise this embracement of open source — an example of which is the UNICEF GitHub organization (Bedi *et al.*, 2020).

The power of open source has captured the attention of governments as well. Government of India, for example, is a strong advocate and promoter of open source, having recognised its role in bridging the digital divide in the country. Driving open source innovation and open APIs has been a central pillar of the Digital India vision (Anandaram, Chetty, Josie and Kripalani, 2021). Many of the government's citizen connect initiatives like *Aarogya Setu*, Aadhar, and CoWIN have made use of the open source (Sharma, 2021). This has helped accelerate the development of these programs and allows others to integrate and build on them.

A centralized repository of such information by G20 could help developing countries to achieve sustainable, inclusive, and resilient recoveries. It could potentially accelerate innovation and discovery across sectors associated with the Sustainable Development Goals while minimising legal or financial impediments.

Table 3: Faster Catch-Up in Digital Infrastructure and Services

(Per 100 Inhabitants)

Country	Internet users (%)		Fixed broadband subscriptions		Active mobile-broadband subscriptions		Mobile -cellular subscriptions		International bandwidth per Internet user (bit/s)		Fixed -telephone subscriptions	
	2015	2020	2015	2020	2015	2020	2015	2020	2015	2020	2015	2020
Argentina	68.0	85.5	15.9	21.2	76.7	68.6	143.6	121.2	35157.7	..	23.4	16.3
Australia	84.6	89.6	28.5	35.7	126.4	124.2	107.7	107.7	27671.5	..	35.5	24.3
Brazil	58.3	81.3	12.5	17.1	88.3	89.7	126.1	96.8	23477.3	..	21.4	14.4
Canada	90.0	97.0	36.4	41.9	61.2	72.2	82.6	85.7	61682.7	..	43.3	35.3
China	50.3	70.4	19.7	33.6	55.3	94.8	91.8	119.4	6506.0	43459.9	16.4	12.6
France	78.0	84.8	41.7	46.9	75.3	99.3	103.5	111.5	47735.2	..	60.4	57.8
Germany	87.6	89.8	37.5	43.2	71.5	90.7	117.8	128.2	42575.5	..	55.4	45.7
India	14.9	43.0	1.3	1.7	9.2	52.5	76.4	83.6	9777.7	56109.8	1.9	1.5
Indonesia	22.1	53.7	1.5	4.3	41.6	104.2	131.2	130.0	26603.7	119998.4	4.0	3.5
Italy	58.1	70.5	24.6	30.0	82.9	93.2	144.8	128.3	28391.8	..	33.4	32.4
Japan	91.1	90.2	30.4	34.8	127.2	202.3	125.5	154.2	21610.1	..	49.8	49.0
South Korea	89.9	96.5	39.4	43.5	107.4	116.9	116.0	137.5	45777.3	..	56.8	46.5
Mexico	57.4	72.0	12.1	17.0	52.5	78.6	88.4	95.3	30599.8	..	16.6	19.0
Russia	70.1	85.0	18.5	23.2	69.8	100.2	156.8	163.6	27553.4	..	24.5	17.7
Saudi Arabia	69.6	97.9	20.0	22.7	105.3	118.9	166.5	124.1	83581.4	351794.1	11.8	16.5
South Africa	51.9	70.0	2.5	2.2	57.4	110.7	158.9	161.8	15301.1	27363.3	7.5	3.5
Turkey	53.7	77.7	12.1	19.8	49.7	77.8	93.8	97.4	57652.0	135690.2	14.6	14.8
United Kingdom	92.0	94.8	37.4	40.3	84.8	107.7	120.3	116.4	363087.0	..	50.4	47.2
United States	74.6	90.9	31.9	36.6	117.0	156.7	119.1	106.2	100322.6	..	38.9	30.7

Source: ITU Statistics

Table 4: Initiatives Promoting Open Source Innovation

Institution	Action
UNCTAD	Adoption of resolution by Economic and Social Council
UN	Open source initiative
UNICEF	Developed tools and platforms

Source: Compiled from various sources.

Regulatory Framework

Data free flow with trust (DFFT) – which seeks to enable cross-border free flow of data while addressing concerns over privacy, data protection, intellectual property rights, and security – has been a priority for global digital policy coordination since the G20 first raised it during Japanese Presidency of G20 in 2019. Further, the Italian presidency in 2021 underscored the importance of enhancing regulatory frameworks for workers on digital platforms, which have seen a monumental rise during 4IR. Data, which is widely regarded as the oil of the 21st century, has seen an exponential rise with global digitalization. The production and storage of data in such large quantities is fraught with security challenges, especially in an increasingly connected world. Leakage or theft of data could lead to misuse and distort the growing trust on digital platforms.

The policymaker's challenge is to find balance between consumer privacy and cyber security while benefitting from free flow of data, including increased and inclusive digital trade. In this direction, G20 should promote data localization while also coming up with an international regulatory framework governing cross-border data flows that balances privacy, use, and safety while also provides flexibility, allowing countries with varying levels of readiness and capacity with necessary policy space.

Countries are increasingly introducing personal data protection frameworks. Continued dialogue to achieve greater interoperability between these frameworks, notably in the OECD, could help provide useful guidance for the trading community. In turn, trade can help to provide the impetus and incentives for regulators to find commonalities across their different approaches, to support a global digital ecosystem (Casalini and López-González, 2019). There are a number of countries that are using data regulation for industrial policy purposes. Bringing policies under the aegis of trade agreements to ensure that approaches remain transparent, non-discriminatory, and least trade restrictive in pursuing the stated objectives might help contest these practices. As more countries rely on adequacy or equivalence assessments by public or private bodies, there might be scope to exchange information and views on the processes through which these are established. While this paper takes a trade perspective, interoperability between different data protection systems can be important not simply for trade but, equally, for ensuring that public policy objectives such as privacy and security can be met in digital world.

The G20 can follow the APEC Privacy framework - Cross Border Privacy Rules (CBPR) system which identifies best practices that each member country can tailor to its domestic legal system

and allow for interoperability between countries. The scope and implementation mechanisms under CBPR can vary according to each member country's laws and regulations and providing flexibility for governments to design national privacy approaches. If a government joins the CBPR system, every domestic organization is not required to join; however, becoming a member of CBPR may benefit an organization engaged in international trade by indicating to customers and partners that the organization values and protects data privacy (Fefer, 2020). With certified enrolment in CBPR, organisations can transfer personal information between participating economies and be assured of compliance with the legal regimes on both sides of the trade.

WTO may incorporate a horizontal obligation enabling cross-border data flows for purposes of conducting business transactions and prohibiting data localization measures (Mitchell and Mishra, 2019). Privacy is a prerequisite for instilling greater digital trust. The current GATS framework allows an exception for privacy measures, but this exception is insufficient as 'data-source countries' are unlikely to 'accept one-sided limits on their right to protect privacy'. In other words, to enable cross-border data flows, both data-source and destination countries should have effective privacy frameworks. Therefore, WTO law should require all members to adopt a basic regulatory framework for protection of personal information or privacy protection is fundamental for ensuring free flow of data. Members should adopt a mandatory cooperation mechanism for addressing the transnational aspects of online consumer protection, including information-sharing and providing assistance for cross border enforcement of consumer protection laws. Countries should adopt measures that they consider appropriate and necessary to protect the personal information of users.

Labor Force Preparedness: Up-skilling and Re-skilling

Work under Industry 4.0 regime impacts flexibility, working time, health, demographics and private life. This amounts to a significant transformation in jobs and skill profiles. Unlike the clear division of labor in industries like manufacturing and vertical & rigid organizational structures, there is going to be new structural set-ups requiring more decision making, coordination, control and support services. There will also be a need to coordinate between virtual and real machines and plants in production management systems. Developing countries should try to develop resilient and adaptable labor markets that allow workers and countries to manage the transition to this new technological age with the least disruption. Investment in education and training should be made to skill and re-skill young people for the jobs of the future and for equipping them with the right type of skills to successfully navigate through an ever-changing, technology-rich work environment.

As part of upgrading educational and pedagogical methods to usher in 4IR, digital learning platforms assume greater importance. The onset of the pandemic reinforced this trend. Taking advantage of digital learning platforms, Online Open Courseware called MOOCs (Massive Open Online Course) have become a practical method to address the inefficiency associated with conventional learning platforms. Many private-sector companies have the unique

value proposition of housing online training courses aimed at supporting the workforce development needs of current employees. With the understanding that these trainings are proprietary, and often tailored to the specific customer and employee needs of the company, open-source online courses also exist and can be leveraged for the specific business needs of the future. These could be particularly effective if accompanied by mentorship, coaching, and hands-on learning. Working with already established mobile-enabled platforms, such courseware could be leveraged to promote cross-cultural education and global connectivity, further supporting companies' development of fractured work cultures (Deloitte, 2018).

While online platforms support localized versions of the transactional gig economy, several initiatives have recognized the need for skills matching platforms that support low-skill jobs or resource needs in geographically dispersed communities. Some platforms target workers in informal or low-paid sectors allowing them to post digital CVs and receive real-time job listings via SMS, creating a gig-economy platform for traditionally disconnected labor markets. These platforms also allow automatic matching of available opportunities and workers based on posted skills and location data. There is widespread agreement on the benefits of the digital labor platforms due to their ability to address labor market inefficiency on a global scale, facilitate job matching in local markets, reduce recruiting time, and create opportunities for workers to reach new markets and audiences. There are potential obstacles that could hinder long-term global adoption such as youths' access to mobile phone data and affordability, understanding the target population's literacy level, local use of multiple languages or dialects, potential for geographical and age discrimination in the absence of globally standardised signaling and credentialing, and the need to gain a critical mass of youth users to gain credibility.

The fourth industrial revolution has posed challenges and opportunities for the developed and developing countries alike. However, evidence from the past suggests that industrial revolutions have generally nurtured more growth in the developed economies than in the developing economies. The latter are also more vulnerable to the threats of 4IR. Nonetheless, new technological advancement - AI, 3D printing, robotics - offer prospects of positively impacting all countries, and G20 nations in particular, irrespective of their level of development, need to undertake appropriate measures to promote Industry 4.0 and address the potential threats to national security through data protection and localisation.

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India Narrative of Development- USP of G20 India Presidency

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India will take over the presidency of G20 around December 2022 till the end of next year at very challenging times. The current challenges include the Russia-Ukraine conflict that is going on for the last six months, China-Taiwan crisis, global supply chain disruptions due to Covid-19 pandemic, climate change, slowdown in international trade and rising global debt. As a result, global growth is hugely impacted. The deliberation in G20 is equally affected as the G7 countries are not even willing to have a photo opportunity with the Russian Sherpa. This is the hard reality of the world today. On the other hand, every challenge can be considered as an opportunity. Indian presidency of G20 could exploit that opportunity. India has great political capital and very seasoned political leadership to drive the G20 presidency.

In general, there are three key issues that could come to the centre stage during Indian presidency on which consensus could be arrived among the G20 countries.

Inclusive, Equitable Growth

Firstly, the world is in need of higher economic growth, and this growth has to be brought to the centre stage in the development process. There cannot be elimination of poverty, achievement of goals laid down at COP-21 & COP-26 and climate sustainability without growth. Growth alone will enable the emerging markets and the South to lift a vast segment of the population above the poverty line. In fact, a huge segment of people who were lifted above poverty line in the past had happened when global growth was taking place. Several countries rode the wave of growth. Moreover, this high growth could happen when international trade grew and blossomed as well. Therefore, first and foremost, the critical challenge for the world today is to drive growth and bring growth to the centre stage. This growth has to be inclusive and equitable.

Sustainability

Secondly, any growth today has to take place in the context of sustainability,

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(*Edited excerpts of his speech at the Development Conclave on Towards Indian G-20 Presidency- Delhi Process VI: Exploring New Development Paradigms and Growth Strategies: Partnerships in Times of Transition and Contestations organised by RIS, New Delhi on August 27-28, 2022*)

climate adaptation, climate mitigation, etc. Sustainability is not a challenge, but a huge opportunity for the whole world. India too sees this as a massive opportunity not a challenge. Historically, India has not been a polluter in the world. In the total carbon space available, considering at 1.5 degree, 2400 Gigaton was available. India contributed only 52 Gigaton which is 1.5 per cent. India is logically entitled to 17.5 per cent on a per capita basis. The Prime Minister of India committed to a particular strategy at COP-21 and India is the only country in the world which could able to achieve its NDC target. None of the G20 countries achieved it. India was the only country which achieved its NDC targets nine years ahead of the schedule.

India could do this because of really top class entrepreneurship. This made us believe that much of this change will have to be driven by the private sector. But the challenge really is that India is climatically blessed. It does not face the challenge which many other countries do except the Middle East, as far as climatic conditions are concerned, not even China. But to be able to accelerate the pace of green growth, to be able to accelerate the pace of both renewable and the pace of decarbonizing some of the hard-to-abate sectors, and to become the first country in the world to industrialize without carbonizing, finance is needed at low cost. The developed world has been committing to this, but does not live up to its commitments at all.

Low Cost Finance

In reality, as analysed by the NITI Aayog from COP-1 to COP-26, the developed world has been giving long term commitments and not fulfilling any of its commitments. From one COP to another, they keep shifting the goal posts and keep talking long term goals. So in 2050, you will have another new goal of 2080 or 2090. Unless and until we achieve short term goals, it will be very difficult for the world to achieve this. Achieving short term goals, as has been accepted in the COP on principles of climate equity and justice, finance has to flow into the emerging markets. But, finance is actually not flowing in. The basic difference between achieving what India has committed to is to get finance at low costs. There is very little political capital in the developed world to make finance available to which it has already committed to.

On the other hand, money can flow in from development finance institutions but most of them were structured for the post-World War II period in the Bretton Woods period. For instance, both the World Bank and IMF are not designed for the post-COVID and post-Climate change era which would necessitate a lot of first loss guarantees, blended finance, and ensuring that large sums of money are able to flow to good entrepreneurship in the emerging markets. Therefore, this would require restructuring of development finance institutions by enhancing the equity base substantially by the developed world to enable them to lend for climate finance. In fact, this is one of the key challenges before the world today. Unless that happens, it will be very difficult for the World to achieve its net zero targets. Therefore, climate change will be a very key challenge.

Accelerated Implementation of SDGs

The third key perspective has to be the accelerated implementation of

sustainable development goals, because the development agenda, and the huge impact which the COVID has had in terms of vast segments of population slipping back in terms of learning outcomes, health outcomes, and in terms of poverty is a major challenge to the world. There can be no growth without lifting the vast segments of people above poverty line. Poverty in one part of the world is a challenge across the world. Therefore everybody must get uplifted. Huge amount of political capital was spent on acceptance of SDGs, as it took almost five years to arrive at a consensus on SDGs. Therefore, accelerating the pace of SDGs by 2030 remains a key challenge.

India has done a lot of work in terms of localization of SDGs, in terms of ranking its own states, and ranking its own districts on the basis of performance. India has done a huge amount of work through cooperative and competitive federalism in terms of SDG implementation. Some of this include ensuring that electricity reaches every single household, roads reach every village, everybody gets Covid vaccine through the COWIN process, houses are provided to every single individual, sanitation reaches every individual and ensuring that water through pipes reaches every household. These are massive targets for a country of 1.4 billion people which is bigger than 25 countries of Europe. Therefore, much of this development story flows from the Indian experience. All this gets reflected in its performance in SDGs. It has enabled India to lift huge segments of population above poverty line. Hence, the onus is on accelerating the process of SDGs implementation across the world.

India Narrative of Development

Besides the three broad perspectives, it is very important to understand that there has to be an India narrative during the G20. India must leave behind its legacy while celebrating democracy in its 75th year of democracy through the *Azadi ka Amrit Mahotsav*. As India in the next 25 years turns 100, to transform India into a developed country in one generation would really mean that India has to accelerate the pace of growth at high rates, and ensure that much of that benefit goes across to the people living below poverty line.

What is the narrative that India can build in into this growth story, into the G20 growth story? The first and foremost, as the Prime Minister stressed at length is LIFE-lifestyle for environment. When the Western world was growing, it grew by polluting the world. It had a model where for every 1000 people, there were 1100 cars. Cities were made for cars and not for the people. Likewise, in Europe, there were 900 cars for 1000 people. In India, we have only 22 cars per 1000 people. So there is a huge opportunity in adopting a totally different model of development. This different model will involve urbanisation as part of the development process. India will have 500 million people getting into the process of urbanisation in the next four decades whereas the western world America in particular, is already urbanised. The challenge for India will be to build two Americas; building a Chicago every three years. Therefore, how to urbanise in terms of public transport, recycling of water and waste, using public mobility, etc will be the key challenge of this transformation. At the heart of this growth in the next few decades will be the

strategy of energy transition. There can be no growth without energy transition.

Further, how do we urbanize using the strategy of renewables? In particular, how to use renewables to crack water, build green hydrogen and then decarbonise hard-to-abate sectors like refineries, fertilizer, steel, cement, long distance transportation remains tough challenges. On these challenges everybody in the world is at the same stage. For example, it is like saying that Maruti and Tata Motors are both at the same stage. Tatas have done electric mobility resulting in rapid rise in their sales per unit. Unless Maruti does that, it will not be able to keep pace. In fact, Mahindra has announced five new SUVs and electric mobility. As everybody in the world is at the same stage, it is an opportunity for everyone. Whoever technologically leapfrogs in this transition will be the leader in the world. In this regard, the emerging world has to get into sunrise areas of growth which are going to transform these countries.

The next question is the sunrise areas of growth. For long, the developing world and the Southern world have been talking about sunset areas of growth. As long as you keep talking about sunset areas of growth, it would be very difficult to grow with sustainability. Therefore, it is important to look at cutting edge areas of growth that will enable to grow at high rates of 9 to 10 per cent over the next four to five decades and lift vast segments of population. In addition, unless the focus is centred on digital and green transitions, it will not be possible to achieve this growth. As Europe will put border taxes by 2026, none of the developing countries will be able to export steel, cement and a whole range of products. Countries may not remain as an exporting country anymore. Countries will not be able to penetrate to the global markets post 2026. Hence, countries need to go digital and green; not for America, not for Europe, but for ourselves. We need to transform ourselves to be able to penetrate and become a global champion.

India needs to replicate what has been achieved domestically in the digital world. India successfully created an alternative model to the big tech model of the United States of America. For India, data is not owned by Google and Facebook; it is owned by public entities. Every single Indian has an identity that is consent based. Digital payment today is 20 per cent higher than the digital payment of United States of America and China together. All these are happening using mobile phones. A vast segment of people in India are doing it. Moreover, India created the COWIN, a digital public good, which enabled people to do vaccination totally paperless, cashless and seamless.

All the public digital infrastructure India has built like Fastag, etc. which is happening rapidly in other sectors such as health, nutrition, education, agriculture, etc. These public digital infrastructures were possible because India allowed the private sector to innovate. India is the only country in the world where PhonePe competes with GooglePay in the marketplace over the Unified Payment Interface (UPI). It is the only place where Ola and Uber compete in the marketplace. So, we created a unique digital public infrastructure, which has to be replicated across the world. That is the legacy of India.

In India, individual data does not vest in big tech companies, rather it is individual consent based. The strength of this digital power can be leveraged.

India has not gone around the world building roads and infrastructure in other countries pushing the countries into debt trap. That is not the power that India cherishes. India believes in the soft power of digital India. Our belief is that India can create a cloud in a box which can then penetrate and made available to the citizens across the world so that they can be fully empowered. India believes in empowering citizens; not putting them into debt traps.

The legacy of India has this unique digital public infrastructure. It would also be a unique legacy of how India has seen energy transition despite all challenges nine years ahead of schedule. Now the focus is on green hydrogen to decarbonize. This is what the Prime Minister of India talks about LIFE in the context of; lifestyle for environment must be changed. Individual consumer choices must change because governments in the developed world will not deliver. They have not delivered from COP-1 to COP-26 andthey will not deliver ever. Individuals must take leadership position, transform their behaviour and nudge other towards this transition. In essence, nudging and behavioural change hold the future. The Prime Minister of India has the foresight and the vision to do this.

The private sector will have to be a key player and partner in this growth process. India has been the fountainhead of democracy. It has been the motherhood of democracy in the last 75 years, and in the next 25 years as its drives growth through behavioural change, energy transition, digital public infrastructure and a vast acceleration of its developmental schemes at the grassroot level, it would lead to accelerated implementation of SDGs on ground. This is the India narrative which India must build into the G20 story. The challenge really is to put together all these countries and arrive at a consensus because G20 is all about consensus. It is about learning from each other and building consensus, often at challenging times. One can hope that the G20 countries, along with the several institutions like the IMF, the World Bank, etc. play a key role in exploiting the unique opportunity ahead. India will live up to this challenge and provide unique political leadership under the Prime Minister Modi to really truly take the world to another era of accelerated trade, sustainable and green growth and accelerated implementation of SDGs.

Continuity and Sharpening Priorities- Mantra for G20 Development Agenda

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It is appropriate for India to assume Presidency of G20 in 2023. Soon after independence India was one of the chief architects of the Bandung process, the Asia Africa summit in 1955. Despite the challenges after independence, India realised the the value of South-South cooperation. In fact, the template for South-South cooperation was set in Bandung conference in 1955. We have deviated from that vision of the founding leaders of Bandung Process. Hopefully, it will come back to the centre during India's Presidency in 2023. In other words, it is to ensure that during India's chairship of the G20, 'development' would move from the margins of the G20 agenda to the centre of its agenda. The collective wisdom of all of us is required to achieve this.

In 2010 when the G20 decided that to bring development into the G20 agenda, the Seoul Consensus for Development through the nine point plan was adopted. The Development Working Group (DWG) was created. South Africa was fortunate to be asked to serve as a permanent member of the G20 Development Working Group. Part of the problem with the development agenda in the G20 is that it is still in its developmental stages. It has never been part of the mainstream. It was a good after-thought, if one could say that G20 is also deliberating one of the most critical issues on the global agenda, to have the Development Working Group. The structural challenge is that every year each country comes with a set of priorities, not only as the vision for the G20, which is good to bring in refreshing new and creative ideas, to the G20 agenda but in the development agenda. Most importantly, there is no continuity including policy continuity which is a big challenge. All the G20 members, when they come into the chair will have a set of priorities, including the development agenda, and at the end of that chairship it seems to fall by the wayside.

For instance, during the Australian presidency, 25/25 was adopted in the Brisbane Summit. It was conceived to advance women empowerment by

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ensuring that at least 25 per cent of women are in the workplace. Today, we are far from achieving that goal, and surprisingly it is no longer a priority issue in G20 now. The current Presidency, Indonesia has set women economic empowerment as one of the critical focus areas of its Presidency. Turkey followed Australia, and so would the others. But there is no continuity and therefore we fall short of a very vital component of the global development agenda.

Africa has been featuring constantly as a focus area. However, it has not received proper attention in various presidencies. Hopefully, during Indian Presidency in 2023 it will not just be a verbal articulation but some practical examples of how G20 can take this agenda forward. China in 2016 had put forward the priority of industrialisation of Africa and the LDCs. But after Chinese Presidency, nothing much has happened. Yet, industrialisation of Africa and the Global South is a critical component of addressing the developmental agenda.

This is the faultline that we need to address in trying to bring the development agenda to the centre. Although Development Working Group was discussing great ideas, development was not even featured in the discussions within the Sherpa track. It was something that fleetingly caught our interest. In fact, when South Africa put the issue of illicit financial flows on the Sherpa agenda, it was relegated to the Development Working Group, and then it was given to the OECD to develop a paper on it. That was the end of it. Africa loses a close to US$100 billion annually as a result of illicit financial flows. Now imagine if those funds could be retrieved and invested into the development agenda; what a difference it would make for Africa. One of the things to consider under India's Presidency perhaps is to have the meeting of development ministers with an aim to put development on the centre stage of the G20 agenda. By doing so, the development agenda can be elevated to the status of the ministerial tracks.

With respect to the consecutive presidencies of G20 by IBSA countries in the next three years, there should be coordination. It is a marvellous opportunity for the IBSA countries-India, followed by Brazil and South Africa to coordinate what we would like to achieve over the next three years in advancing the development agenda. Likewise, proper coordination can be established for the larger G20 agenda. In particular, policy coordination especially on goals and practical outcomes for the development agenda between the three IBSA countries can be explored.

The experience of IBSA can be referred to in the G20 development agenda. IBSA fund for poverty and hunger alleviation is a landmark new template on South-South cooperation. About US$35 million have been invested in over 30 plus projects in over 30 countries in the Global South. It has made a positive impact on the lives of millions of people. Since the Fund has won several awards from the UN as being a new template on South-South cooperation, the elements of this initiative can be brought into the development agenda under the Indian presidency of G20.

While appreciation of development issues is fine, it is important to stop or at least arrest the continuous weaponization of development. Weaponization of development is observed in the current global environment; perhaps an inflection point in human history. Rightly so, it is an inflection point and the choice the

humanity makes going forward is going to have severe implications for the future generations. It is going to have severe implications on the development agenda. In 2020, as a result of the pandemic, a further 97 million people were pushed into extreme poverty. In other words, three or four crucial years are lost in terms of achieving our development goals and eradicating extreme poverty on the global stage. We can collectively work towards the deweaponisation of global development in terms of an inclusive global community, and taking forward the SDGs.

G20 host Indonesia Promotes FX Diversification as Part of Stimulus Exit

Top Indonesian economic leaders advocated the use of local currencies in trade and investment instead of the U.S. dollar to ensure global financial market stability as pandemic-era stimulus is withdrawn. Local currency settlement (LCS) procedures should be implemented globally to minimise shocks. Emerging nations face capital outflows when larger economies tighten monetary policy. LCS can build a financial safety net for cross-country transactions and minimise financial instability risks from global economic shocks. Diversifying currencies might help countries recover from the Covid-19 pandemic. Priority for G20 meetings will be to ensure rich nations' exit from easy monetary policy is effectively calibrated, planned, and communicated to prevent spillover impact on emerging economies.

Source: Suroyo, G., & Nangoy, F. (2022). G20 host Indonesia promotes FX diversification as part of stimulus exit. Reuters. Retrieved from https://www.reuters.com/world/asia-pacific/indonesia-cbank-targets-10-rise-local-currency-settlements-2022-2022-02-16/.

Indonesia's G20 Presidency Seeks Global Deal on Energy Transition

Indonesia wants to speed up the energy transition under its G20 presidency. Energy transition is one of Indonesia's G20 priorities. The energy transition working group (ETWG) focuses on access, technology, and funding. To enable a just energy transition, negative socioeconomic impacts must be minimised. So, Indonesia appeals for global cooperation. Investments and contributions from the private sector, philanthropy, and innovative financing can underline wealthy nations' commitment to provide US$100 billion a year (in climate finance) for their developing counterparts. Indonesia is building a green industrial park in North Kalimantan as part of its energy transition to target net-zero emissions by 2060 or earlier.

Source: Jakarta Globe. (2022). Indonesia's G20 Presidency Seeks Global Deal on Energy Transition. Retrieved from https://jakartaglobe.id/news/indonesias-g20-presidency-seeks-global-deal-on-energy-transition.

Indonesia to Urge G20 to Establish Global Health Fund

Indonesia will urge the G20 to establish a global body that can dispense emergency funds during a health crisis. Under the current system, countries are "basically on their own" if they need emergency funds, vaccines, therapeutics, or diagnostics. No global health institution has enough power or money to help. WHO and other aid groups said a global health initiative to make Covid-19 vaccines and testing available to poorer countries received just 5 per cent of targeted donations for this year's aims. Indonesian President Joko Widodo urged support for this initiative from developed countries. Indonesia would also push for a global genomic data sharing platform, harmonised global health protocols, and a global manufacturing and research hub.

Source: Indonesia to Urge G20 to Establish Global Health Fund. (2022). Retrieved from https://www.reuters.com/markets/asia/indonesia-urge-g20-establish-global-health-fund-2022-02-11/.

G20 Nations Seek Sustainable Financing Scheme for Future Pandemic Response

G20 Finance Ministers and Central Bank Governors are seeking a sustainable international financing scheme to build global pandemic resilience and reduce health system gaps. G20 members should collaborate to build a more resilient global health system, which will require more investment and financial resource mobilisation, and build multilateral platforms to help developing and low-income countries out of the crisis. Expeditious and equitable vaccine distributions can help close global pandemic gaps. Countries must also increase international investment in health security to build stronger healthcare infrastructure. US Treasury Secretary Janet Yellen proposed a new donor-controlled global health fund for pandemic prevention and preparedness. The fund will help developing and low-income countries improve surveillance systems to prepare for future crises and strengthen their healthcare workforces.

Source: Business Standard. (2022). G20 Nations Seek Sustainable Financing Scheme for Future Pandemic Response. Retrieved from https://www.business-standard.com/article/international/g20-nations-seek-sustainable-financing-scheme-for-future-pandemic-response-122021800205_1.html.

G20 Must Push Relief to Avoid Debt Crises

As the pandemic battered global economies, the G20 launched measures, including a temporary debt service suspension for poor countries, which has now expired, and the Common Framework - a debt restructuring scheme for long-term relief. Zambia, Ethiopia, and Chad have yet to receive Common Framework relief after a year. Other governments have avoided the Common Framework out of uncertainty and fear of market punishment. 60 per cent of low-income countries, mostly in Africa, are in debt distress or at high risk, up from 30 per cent in 2015. 74 low-income countries owe US$ 35 billion to bilateral and private lenders this year. Janet Yellen will urge her G20 counterparts to help poorer nations. Sovereign debt crises will prevent vulnerable countries from fully recovering after the pandemic unless these efforts are strengthened.

Source: Bavier, J., & Savage, R. (2022). G20 Must Push Relief to Avoid Debt Crises - Experts, Campaigners. Retrieved from https://www.reuters.com/world/g20-must-push-relief-avoid-debt-crises-experts-campaigners-2022-02-17/.

Only 6 Per cent of G20 Pandemic Recovery Spending 'Green', Analysis Finds

Out of US$14tn in economic stimulus, only 6 per cent of pandemic recovery spending was "green." 3 per cent of the amounts governments spent to rescue the global economy from the Covid-19 pandemic was spent on activities that will increase carbon emissions, such as coal subsidies, and will do little to reduce greenhouse gases or shift the world to a low-carbon footing. Economic recovery spending could have helped us stay below 1.5^0C. Nations missed the opportunity to attach "green strings" to fossil fuel industry rescue packages during the pandemic. The Covid-19 recovery is less green than the 2008 financial crisis recovery, when 16 per cent of recovery spending went toward green activities. By under-pricing fossil fuels and underspending on green recovery, G20 economies fail to build back greener and provide the global leadership needed to reach net zero carbon emissions by 2050.

Source: Harvey, F. (2022). Only 6% of G20 Pandemic Recovery Spending 'Green', Analysis Finds. The Guardian. Retrieved from https://www.theguardian.com/environment/2022/mar/02/only-6-of-g20-pandemic-recovery-spending-green-analysis-finds.

G20 Accused of Failure to Back Up Cop26 Climate Pledges

G20 members failed to adhere to climate pledges agreed at Cop26 in Glasgow. Global leaders and climate activists agreed on efforts to achieve net neutrality and limit global warming to 1.5°C. Bloomberg determined that no G20 member has introduced enough plans to "deeply decarbonise". Developed nations are some of the world's biggest polluters and are responsible for about 80 per cent of global emissions. Decarbonising the power and transport industries has been effective, but building and industrial carbon capture, as well as the renewable "circular economy," have been slower. Due to the Ukraine situation, governments are focusing on energy security. This is consistent with carbon-cutting initiatives including renewables, electrification, low-carbon fuels, and energy efficiency.

Source: Murphy, N. (2022). G20 Accused of Failure to Back up Cop26 Climate Pledges. The National News. Retrieved from https://www.thenationalnews.com/business/road-to-net-zero/2022/03/29/g20-accused-of-failure-to-back-up-cop26-climate-pledges/

Crypto Assets Could Threaten Financial Stability Globally Warns G20 Group

The Financial Stability Board, a G20 advisory council, cautions that crypto assets could jeopardise financial stability due to their magnitude, structural vulnerabilities, and increasing interconnection with the existing financial system. The dangers come from expanding linkages between crypto-asset markets and the regulated financial system; liquidity mismatch, credit and operational risks etc. Money laundering, cybercrime, and ransomware are further issues. The paper argues crypto asset price volatility has not affected traditional financial markets due to their small size but if crypto-asset growth at systemically significant banks and other financial institutions continues, it might affect global financial stability. Some of these risks are already apparent, such as protocol and technology concentration risk, operational and cybersecurity issues, and governance failures. To tackle potential dangers, the report recommends enhancing monitoring and minimising regulatory arbitrage through cooperation and information exchange.

Source: Knutson, T. (2022). Crypto Assets Could Threaten Financial Stability Globally Warns G20 Group. Forbes. Retrieved from https://www.forbes.com/sites/tedknutson/2022/02/16/crypto-assets-could-threaten-financial-stability-globally-warns-g20-group/?sh=b4fdd4d68a15

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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