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RESEARCH PAPER

The Assessment of Sustainable Development Goals Through the Impact of Exploring Digital Technology Innovation and Climate Change Integration, Conflicts and Natural Disasters

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ABSTRACT

PURPOSE: The objective of this study is to assess and review the United Nations' Sustainable Development Goals (SDGs) in light of digital technology developed by the digital revolution, innovation and climate change integration, COVID-19, world global wars, conflicts and natural disasters and their implications for the implementation of Agenda 2030.

METHODOLOGY/APPROACH: A descriptive review analysis approach is employed to assess the externalities associated with the purpose of the study.

FINDINGS: Ensuring that all countries have the capacity to track progress towards the SDGs is critical for the overall success of the 2030 Agenda. Data gaps influence the understanding of progress of 2030 Agenda because of biased conclusions. The SDGs reporting framework should be changed and updated to accommodate these externalities. If this does not happen, a large proportion of the population miss vital information about what are considered good policies.

ORIGINALITY/VALUE: This study contributes to the body of knowledge by suggesting revisions of SDGs based on the theme of this paper.

PRACTICAL IMPLICATIONS: The findings of this study will help those concerned with SDGs to revise the SDGs reporting framework to accommodate the shortcomings created by the digital revolution,

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innovation and climate change integration, COVID-19, universal wars, conflicts and natural disasters; there are implications for most of the 17 SDGs. UN institutions, countries' policy-makers, international and regional organisations, academic and research institutions and public-private partners, will benefit from this study's findings and accommodate these shortcomings to modify the implementation of SDGs that should be achieved by 2030.

KEYWORDS: *SDGs Revision; Digital Revolution; Innovation and Climate Integration; Global Conflicts; Pandemics; Disasters; Data Gaps*

INTRODUCTION

The United Nations (UN) 2030 Agenda and its Sustainable Development Goals (SDGs) are a global call to action to end poverty, protect the earth's environment and climate, and ensure that people everywhere can enjoy peace and prosperity. These are the goals of the UN 2030 Agenda that replaced the eight Millennium Development Goals (MDGs) in 2015.

The Sustainable Development Goals (SDGs), introduced by the United Nations in 2015, offer a broad framework that provides several targets based on the 17 SDGs to be fully implemented by 2030. The 17 SDGs uphold sustainable development richness in its three dimensions (economic, environmental and social) to enjoy the benefits of SDGs and protect the ecosystem through innovation and climate integration.

The 2030 Agenda's SDGs address sustainable development issues varying from poverty and hunger to climate action and justice, peace, institution-building partnerships and other goals indicated in SDGs' targets. SDG 1 aims to end poverty, guaranteeing identical access to economic resources and basic services, while SDG 2 pursues the end of hunger; it also aims to further sustainable agriculture and agriculturally-based industries to process any surplus agricultural products to ensure a sufficient food supply. These two goals can be achieved using appropriate government policies and the likelihood of success increased by policies to administer aid in times of conflicts, natural disasters and global pandemics.

SDG 3 stresses health and well-being, aiming lower maternal mortality, and end major epidemics and global pandemics such as COVID-19. SDG 4 boosts inclusive, quality education and lifelong learning opportunities to all individuals around the globe to create the human capital skills and, particularly, digital skills needed for sustainable development. The aspirations of SDG 5 address gender equality and the empowerment of all women and girls, ensuring they are offered equal chances in jobs and benefits, while SDG 6 makes certain targets to manage sustainable management of water and

sanitation for all individuals. Whereas SDG 7 promotes clean and renewable energy through introducing sustainable energy sources for affordable, reliable and sustainable energy access to all people around the world.

SDG 8 raises important targets for sustaining economic growth and decent work, with affordable chances for business and the creation of jobs to reduce unemployment around the globe. SDG 9 centres its targets on building a resilient infrastructure and fostering innovation that will help to facilitate the digital economy and physical infrastructure required for the new economy activities. SDG 10 aims to reduce inequalities within and among countries' citizens to provide opportunities to all individuals around the world, and SDG 11 focuses on urban development to make cities inclusive, safe and sustainable to accommodate the increasing numbers of urbanised individuals in all the world's cities. SDG 12 aims to protect the world's environment from the negative externalities generated via the increasing public consumption of goods, and the pollutants generated through the production of undesirable output produced as unpriced by-products in addition to the main products. SDG 12 requires the development of targets to ensure sustainable consumption and production patterns. To support SDG 12 in achieving its targets, SDG 13 (Climate Action) is introduced, targeting urgent actions to tackle climate change and its negative externalities impacts. Also, the outcome of SDG 13 will support SDG 14's targets that are to preserve the blue economy and ensure its sustainability via responsible exploitation of the oceans and marine resources around the globe.

The SDGs of the UN's Agenda 2030 are also linked to achieve collective and connected targets to ensure the targets from SDG 15, the protection of terrestrial ecosystems, managing forests and combating biodiversity loss around the globe, are met. SDG 16 targets are considered important and the starting point and cornerstone for countries experiencing institutional failure through problems of conflicts, wars, absence of rule of law, and good governance and leadership; These problems have caused difficulties regarding access to health, education and other necessary services for their people. In this respect, SDG 16 was developed to promote peaceful societies, justice for all and effective and well-functioning institutions to help these countries to implement SDGs. Finally, to achieve the above mentioned 16 SDGs, SDG 17 was developed to highlight the need for global partnerships in general and smart partnerships between the public and private sectors to help in achieving sustainable development via implanting Agenda 2030. Figure 1 shows the classification of SDGs classification contained in the UN report of 2015.

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Figure 1 Sustainable Development Goals
Source: UN (2015)

This study's aim is to assess and review the SDGs in light of digital technology developed in the digital revolution introduced by Industry 4.0 (what is called the Fourth Industrial Revolution). COVID-19, the Russian-Ukraine and other large-scale wars around the globe have implications within the concept of globalisation and digitalisation. Economic planning in countries that have experienced institutional failure must consider the implementation of Agenda 2030's SDGs based on their country's need. SDG 16 (Peace, Justice and Strong Institutions) is the priority goal for Sudan and similar countries via the implementation of peace agreements and the restructuring of government institutions; this includes the implementation of good governance and rule of law as the priorities to build these countries. Following the digital revolution and Industry 4.0, there is an urgent need to transform global economies into a sustainable digital economy through developing national digital economy flagships and pillars needed to apply economic plans: other SDGs should also be implemented within these plans. Education and health services must be improved, a conducive environment for saving and investment created, research and development, innovation, public utilities and other goals are needed to transform economies to accommodate the innovations brought by globalisation and digitalisation.

There has been a demand to review the SDGs and link them to innovations introduced by the digital revolution; it asked that the performance of SDGs is tracked, using high-quality data and a comprehensive monitoring framework. An article in The Telegraph emphasised the significance of consistent and comparative data to achieve Agenda 2030. In this respect, Bill Gates (Gates and Gates, 2022) stated that the world will miss nearly all UN SDGs by 2030 without radical inventions and innovation. "In a report published on Tuesday [13 September 2022], the Bill and Melinda Gates Foundation said that all the 17 SDGs set by world leaders in 2015 would be missed unless cutting-edge solutions emerged. It also said that without innovation, some goals, such as gender equality, would not be achieved until 2108 – three more generations later than expected" (Barber, 2022). There is a need to link the SDGs to digital technological issues caused by the digital revolution before implementing the 17 SDGs. This study recommends these 17 SDGs should be revised as some are obsolete due to the digital economy issues caused by Industry 4.0, digital technologies and business models associated with COVID-19, and the implications of wars and natural disasters. The revision of the 17 SDGs should be undertaken and linked to the new digital technology or there is a danger that the SDGs will not be achieved by 2030.

Ahmed (2021, 2023) discusses the issues that need to be considered in any review of the 17 SDGs. He looks into the development and policy implications of cross-border flows of big digital data as a principal to all fast-evolving digital technologies. These consist of digital data analytics, artificial intelligence (AI), blockchain, Internet of Things (IoT), cloud computing and other Internet-based services. The topic is appropriate, as the enlargement of big digital data flow relates to the accomplishment of virtually all the SDGs. Countries around the world are struggling to oversee how to implement the SDGs from a policy outlook. The definitive method selected at national and international level will affect not only trade, innovation and economic progress but also an array of issues interrelated to the advantages delivered from digitalisation in the form of digital dividends. The revision of the SDGs regarding green technological progress and the implications of externalities caused by innovation and environmental integration are discussed by Ahmed and Elfaki (2023) and Elfaki and Ahmed (2024). Foreign Direct Investment (FDI) spillover effects and their implications on SDGs and the required revision and modifications are examined by Ahmed and Kailashi (2023).

This study proposes that a digital transformation programme should be undertaken by countries to narrow the digital divide and to improve digital technology dividends. This would contribute to the transformation of digital economies and would enable countries to enjoy high living standards and well-being in the same way as their

Organisation for Economic Development and Cooperation (OECD) counterparts. In addition, classifying the lagging concerning the adoption of digital technology and human capital development will improve standards regarding co-operation and smart partnerships within and between countries. In this respect, the first phase of moving to a digital economy is an emerging digital economy masterplan; this would be used to identify the policies and strategies needed to develop digital economy flagships and pillars to improve the existing digital economy flagships and pillars for countries such as Malaysia, among others. This would include refining and developing the digital economy institutions that are needed to facilitate and govern digital economy activities. In this respect, guidelines are needed for developing a digital economy blueprint and policy implications for digitising the whole economy in general, and Small and Medium Enterprises (SMEs) and Micro-level firms in particular. A framework for digital transformation and developing digital economies should be produced to serve as guidelines for the implementation of a digital economy (Ahmed, 2022a, 2022b).

DIGITAL AND COVID-19 EXTERNALITIES IMPACT ON MDGS UNFINISHED BUSINESS (MDGS 1-5, SDGS 1-5)

This section discusses the implications of digital technology, COVID-19, global conflicts and natural disasters externalities on the Millennium Development Goals (MDGs 1-5), implemented by Agenda 2030 and included in the 17 SDGs. The United Nations (UN) 2030 Agenda and its Sustainable Development Goals (SDGs) are a global call action to end poverty, protect the earth's environment and climate, and ensure that people everywhere can enjoy peace and prosperity. These are the goals of the UN 2030 Agenda that replaced the eight Millennium Development Goals (MDGs) in 2015.

The Sustainable Development Goals Report 2022 (UN, 2022a) outlines procedures towards fulfilling the criteria of the 17 SDGs. The SDGs 2022 report is a combined endeavour involving the Department of Economic and Social Affairs and more than 50 international and regional agencies, based on millions of data points stipulated by over 200 countries and areas. The report discloses that the 2030 Agenda for Sustainable Development is in serious difficulty due to multiple, ongoing and connected crises. There is a need to revise the SDGs in light of the problems created by the COVID-19 pandemic, digital revolution and the digital applications needed to be applied to government institutions, businesses, education, climate change and conflicts, such as the Russian-Ukraine and other large-scale wars, and natural disasters around the globe. All of the above mentioned problems and their complex interactions, impact the implementation of all the SDGs, initiating incidental crises in food and nutrition, energy, health, education, the environment and peace and security. There is a need to get

the world back on track to sustainability, producing a road map that requires rigorous accomplishments on a worldwide scale to overcome these unexpected problems.

The SDGs Report 2022 (UN, 2022a) explained that the COVID-19 pandemic has halted the advance in poverty reduction over the past 25 years, with the number of people in extreme poverty growing for the first time in a generation. In addition, expanding inflation and the war in Ukraine and other large-scale conflicts and natural disasters has impacted the increasing progress regarding tackling poverty beyond the normal rates of poverty around the globe. The combined crises hint at an extra 75 million to 95 million people living in extreme poverty in 2022, contrasted with pre-pandemic predictions, although nearly all countries have presented new social protection instruments in reaction to the crises. Numerous new social protection instruments were short-term in nature, and significant numbers of exposed individuals have not been helped by these new social protection instruments. For instance, the world is not on track to end poverty by 2030, with poorer countries currently requiring extraordinary levels of pro-poor development to accomplish this first sustainable development goal.

The SDGs report 2022 (UN, 2022a) reported that the world is on the brink of a global food crisis, with a higher number of people experiencing hunger and food insecurity even before the COVID-19 pandemic. In this respect, global food supply systems have been weakened by a sequence of expanding conflicts, in addition to climate-related shocks and growing inequalities; subsequently, numerous people will have experienced hunger. Also, the war in Ukraine and other large-scale wars and conflicts around the globe, pose an extra hazard to food security. With the possibility of a rise in hunger levels and starvation, particularly among the poorest and most vulnerable countries, it is more urgent than ever to address the root causes of hunger due to the lack of progress on SDG 2. The global community should act immediately to prevent a paralysing food disaster and the social, economic and political turmoil that could follow due to these conflicts and natural disasters. Climate irregularity, conflicts, economic disturbance due to rising inflation and growing inequalities within and between countries, are keeping the world off track in reaching zero hunger by 2030, as claimed by SDGs 2022 report (UN, 2022a).

The SDGs 2022 report shows that COVID-19 continues to present risks to people's health and wellbeing worldwide and is hindering progress in meeting SDG 3 (Good Health and Wellbeing) targets. Before the pandemic, improvements occurred in numerous health areas, involving reproductive, maternal and child health, immunisation coverage and treatment of communicable diseases, although progress was damaged by massive provincial disparities (UN, 2022a). Wars and conflicts destroyed several

hospitals and health facilities and caused the death of many medical staff and patients; this complemented the health system crises created by COVID-19.

As indicated by SDGs 2022 report, SDG 4 (Quality Education) is the most pandemic affected goal. The COVID-19 pandemic caused crises in education, with critical disturbances in education systems globally. The closure of schools and other education institutions has had severe consequences for students of all ages; this is especially true for girls and those who are underprivileged, including children with disabilities, rural dwellers and ethnic minorities. In addition, global conflicts and full scale wars have had an intensely destructive consequence on the youngest citizens. In May 2022, for example, two-thirds of Ukraine's children had been displaced from their homes, approximately 130 educational institutions had been destroyed and more than 1,500 schools damaged. Despite these challenges, education in Ukraine goes on via remote learning that has been accessible to millions, albeit regularly suspended by air-raid alarms. Thanks to digital technology that provided safe, inclusive and continuous education to those affected by COVID-19, the negative spillover effects of wars and conflicts around the globe, the positive effect of digital technology on online learning has been vital in in dealing with existing and future crises.

The SDGs 2022 report indicated that the world is not on course to accomplish gender equality (SDG 5) by 2030, as the social and economic consequences of COVID-19 has made the gender equality position gloomier. Steps forward in various areas, involving time spent on unpaid care and domestic work, decision-making concerning sexual and reproductive health, and gender-responsive budgeting, is falling behind schedule. Women's health services, previously poorly financed, have encountered the most interruptions: violent behaviour against women continues to be prevalent. Despite women's leadership in responding to COVID-19, they still trail men in acquiring the decision-making positions they merit. Bold steps are needed to accelerate progress, including the elevation of laws, policies, budgets and institutions that advance gender equality. Currently, less than half the data needed to examine SDG 5 are presently accessible; therefore, significant investment in gender statistics is crucial.

DIGITAL AND COVID-19 EXTERNALITIES IMPACT ON SDGS NEW AREAS (SDGS 6-11)

This section explains the implications of digital technology externalities, COVID-19, world conflicts and natural disasters in new areas (SDGs 6-11) that were not included in the MDGs.

SDG 6 (Clean Water and Sanitation): while the COVID-19 pandemic continues, it becomes progressively certain that safely administered drinking water, sanitation

and hygiene services are essential to human health. Unless there is speedy progress, billions of people will not have these necessary services by 2030. Clean water is a vital part of sustainable development and is a further area that is falling behind schedule. In addition, water demand is increasing due to constant population growth, urbanisation and collective compression from agriculture, industry and the energy sectors. It should be noted that decades of exploitation, inadequate management and the over-extraction and contamination of fresh and groundwater supplies have aggravated water stress and worsened water-connected ecosystems; this will affect human health, economic activities and food and energy supplies. In this respect, crucial action is needed to modify the present tendency to safeguard a sustainable and reasonable water distribution system to meet all needs. Collaborative action is needed for the universal implementation of enhanced water resources management, and extra effort is needed to increase investment in water and sanitation. There also needs to be additional collaboration among countries sharing transboundary waters (UN, 2022a).

Nonetheless, as indicated in the SDGs 2022 report, existing progress is inadequate to accomplish SDG 7 (Affordable and Clean Energy) by 2030 as planned. Advances in energy productivity and efficiency are needed to speed up achieving the climate change goal of decreasing greenhouse gas emissions generated worldwide. As the SDGs timeline approaches 2030, hundreds of millions of people lack access to electricity, and the health of 2.4 billion people is in danger due to a lack of clean cooking facilities. Vast inequalities in access to prevailing sustainable energy endure. The COVID-19 pandemic has diminished or reversed existing improvements in the energy sector, while increasing product, energy and shipping prices have increased the production and transport costs of solar photovoltaic components, wind turbines and biofuels globally. There is uncertainty regarding the development trajectory that is already far below SDG 7 ambitions; these uncertainties have been caused by issues such as the Russia-Ukraine war that increased energy supply prices, especially to European countries. In this respect, realising energy and climate goals involves continuous policy collaboration and a gigantic deployment of public and private capital for clean and renewable energy, particularly in developing countries.

As explained in the SDGs 2022 report (UN, 2022a), SDG 8 (Decent work and economic growth) was impacted by the COVID-19 pandemic that caused a terrible economic catastrophe and reversed growth towards decent work for all working categories around the world. Even though the worldwide economy started to recover in 2021, allowing some progress in reducing job loss, resurgence continues to be vague and unstable. It should be noted that recovery arrangements differ substantially

through zones, nations, divisions and workforce marketplace clusters. Developed nations are undergoing further strong recovery; in contrast, Least Developed Countries (LDCs) struggle to maintain a fragile economic growth and labour market due to huge job losses. In this respect, numerous SMEs, specifically, individual SMEs in low and lower middle-income countries, faced difficulties to conduct businesses as usual. The Russia-Ukraine conflict and large-scale wars around the world have severely reversed universal economic growth. The most affected working groups by new variant waves of COVID-19 infections, growing inflation, main supply-chain interruptions, policy reservations and determined labour market challenges, include women, youth and persons with disabilities.

The COVID-19 pandemic has showed the significance of industrialisation, technological innovation and a resilient infrastructure in constructing effective institutions; these show the need to revise SDGs to implement and achieve these goals by 2030 as planned. Economies with a diversified industrial sector and strong infrastructure (e.g., transport, Internet connectivity and utility services) experienced less damage and faster recovery. Overall, higher technology industries performed better and recovered faster, delivering a solid standard of how valuable technological innovation is in achieving SDG 9 (industry, innovation, infrastructure).

SDG 10 (Reduced inequalities) shows that prior to the COVID-19 crisis, positive signals around several indicators implied that income inequality was decreasing. In various countries, for example, the incomes of the poorest people increased quicker than the national median; however, inequalities in other areas continued. Currently, the pandemic effects look to be reversing any positive tendencies. Individuals with comparatively small incomes are at risk of falling behind; the pandemic has also increased structural and systemic differences. Emerging markets and developing economies are undergoing lengthy resurgence, expanding inequalities in income between countries. The number of refugees worldwide, especially after the Ukraine and other global wars, reached the highest absolute number on record in 2021. Sadly, since 2021 the world has witnessed and recorded many migrant deaths and displacement. In the meantime, the war in Ukraine and other large-scale wars continue, forcing yet more individuals from their homes; this has created one of the world's largest refugee crises seen in human history (UN, 2022a).

Regarding SDG 11 (Sustainable cities and communities), the SDGs 2022 report explains that, currently, more than half the world's population live in cities; an estimated 7 out of 10 people will likely live in urban areas by 2050 (UN, 2022a). On the positive side, cities are economic growth drivers and contribute more than 80% of

global GDP. Negatively, cities account for more than 70% of global greenhouse gas emissions. Well-planned and managed cities will contribute significantly to sustainable urban development and can create an inclusive prosperity. However, rapid unplanned urbanisation leads to numerous challenges, comprising a deficiency of affordable housing, deficient infrastructure (such as public transportation and basic services), inadequate open spaces, hazardous air, water and other pollution levels, and risks of increased climate and disaster. The COVID-19 pandemic and other cascading crises exposed deep inequalities, further emphasising the magnitude of sustainable urban development. Increasing the readiness and strength of cities that contain high-quality infrastructure and universal access to basic services, is vital in the recovery period, and in the world's capability to react to forthcoming crises.

DIGITAL AND COVID-19 EXTERNALITIES IMPACT ON THE GREEN AGENDA (SDGS 12-15)

This section explains the implications of digital technology externalities, COVID-19, world conflicts and natural disasters on the green agenda (SDGs 12-15) that were not included in the MDGs.

SDG 12 (Responsible consumption and production) is associated with the concept of pure public consumption as a proxy for negative environmental externalities that impact climate change, biodiversity and create pollution from both the production and consumption of products. In this respect, the SDGs 2022 report states that unsustainable consumption and production patterns are considered to cause the triple global crises of climate change, biodiversity loss and pollution. These triple global crises, caused by both demand and supply sides of the economy, have created a significant negative externality to the pollutants, emissions (specifically related to environmental degradation created by public consumption of goods), threaten human well-being, and will contribute to the non-achievement of the SDGs by 2030. Unless a co-operative universal action to change the world's polluting mentality now, followed by a continuous prevailing development pathway, the Earth will be incapable of sustaining the livelihoods of present and forthcoming generations. In this respect, renovating people's connection with nature is key to a sustainable future around the globe. As the world continues with strategies and smart partnerships for a sustainable recovery from the COVID-19 pandemic, and looks into turning away from global conflicts and natural disasters, governments, the private sector and all citizens should seize the opportunity for public-private partnerships to work together to improve resource efficiency, reduce waste and pollution, and form innovative circular economy components (recycle, reproduce and reuse).

SDG 13 (Climate Action) has a strong connection with SDG 12 (Responsible consumption and production) as these two together address the production and consumption of undesirable outputs, as well as polluting emissions generated by other activities that were not included in SDG 12 negative externalities spillover effects. It should be recalled that the SDGs 2022 report (UN, 2022a) warned that the world is on the brink of a climate disaster, and the window to prevent it is quickly closing. The world's growing heatwaves, droughts and floods triggered by climate change are already upsetting billions of people all over the world and initiating possibly irretrievable adjustments in universal ecosystems. According to the Intergovernmental Panel on Climate Change (IPCC) (the United Nations body responsible for assessing the science related to climate change), "To limit warming to 1.5°C above pre-industrial levels, global greenhouse gas emissions will need to peak before 2025 at the latest. … [they] need to be reduced by 45% by 2030, falling to net zero by 2050". In reply, states are following climate action procedures to reduce emissions and modify climate effects via nationwide determined contributions within and between countries. Nevertheless, present national obligations are not adequate to meet the 1.5°C target. Under these obligations, greenhouse gas emissions will rise by almost 14% over the next decade. Urgent and profound decreases in emissions are required within all sectors to shift from a steep slope towards climate catastrophe to a turning point towards a completely sustainable future.

This study highlights the value of the Blue Economy and its connection to SDG 14, "Life Below Water". The Blue Economy centres on the sustainable utilisation and control of oceans, seas and other sources of life below water to campaign for economically, socially and environmentally inclusive business initiatives. The World Bank defines the Blue Economy as the "sustainable use of ocean resources to benefit economies, livelihoods and ocean ecosystem health" (World Bank, 2017). The activities commonly understood to represent the Blue Economy include maritime shipping, fishing and aquaculture, coastal tourism, renewable energy, water desalination, undersea cabling, seabed extractive industries and deep-sea mining, marine genetic resources and biotechnology (UN, 2023).

Employing sustainable practices that prioritise the preservation of marine ecosystems and biodiversity is necessary for the Blue Economy's future sustainability. SDG 14 focuses on the conservation and sustainable use of the oceans, seas and marine resources for sustainable development. With their advantages to the environment, economy and society, oceans and marine resources are a necessary source of income for a substantial segment of the human population. Marine ecosystems and marine

biodiversity are at risk of deterioration and exhaustion due to pollution, climate change and environmental degradation. Global fish stocks have been falling for years due to unsustainable fishing techniques. The oceans absorb around 23% of annual CO_2 emissions generated by human activity to the atmosphere, helping to alleviate the impacts of climate change (UN, 2022b).

The United Nations SDGs Report 2022 states that human activity is threatening the planet's biggest ecosystem (oceans and seas) and influencing the livelihoods of billions of citizens around the world (UN, 2022a). Moreover, continuing ocean acidification and rising ocean temperatures are threatening marine species and negatively disturbing marine ecosystem services. Further, the oceans are likewise under increasing stress from multiple pollution sources; this is damaging to marine life and ultimately forces its way into the world food chain. It should be noted that the rapidly mounting consumption of fish (an increase of 122% between 1990 and 2018), alongside ineffective public policies for managing the marine sector, have led to a reduction in fish stocks. Preventing reductions in ocean health needs strengthened safeguarding energies and the adoption of sustainable Blue Economy solutions. The solutions include a "source-to-sea" method that precisely focuses on the connections between land, water, delta, estuary, coast, nearshore and ocean ecosystems in a reinforcement of holistic natural resources management, and sustainable long-run economic development within countries that have marine industry activities to develop a sustainable Blue Economy that benefits the world.

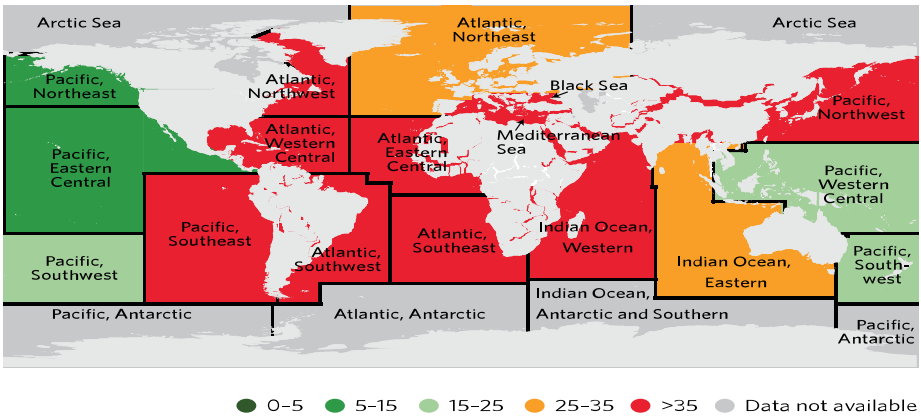

Figure 2 Proportion of fish stocks at biologically unsustainable levels
Source: FAO (2019)

Figure 2 shows the proportion of fish stocks at biologically unsustainable levels, by major fishing areas as defined by the Food and Agriculture Organization (FAO) of the United Nations (FAO, 2019a).

SDG 15, "Life on Land", focuses on preserving planetary ecosystems by highlighting preservation, renewal and sustainable land management (UN, 2015). SDG 15 is key for preserving biodiversity, safeguarding ecosystem strength and promoting sustainable land use procedures (UN, 2015). Conversely, human actions such as deforestation, pollution and climate change involve biodiversity (IPBES, 2019). In this respect, universal deforestation, guided by agricultural development, logging and mining, has led to significant habitat damage and raised carbon emissions (FAO, 2019b). Indigenous communities, profoundly dependent on forests, are specifically affected by negative externalities generated by human activities in the form of unpriced undesirable output that pollutes life on land worldwide. Therefore, enhancing the ecosystem's strength and improving productivity via technological progress that will be achieved through innovation and climate change integration, as well as the refurbishment of these landscapes, guarantees the survival of a diverse array of species, as discussed by the United Nations Environment Programme (UNEP, 2021).

It should be remembered that healthy ecosystems and the biological diversity they support are sources of food, water, medicine, shelter and supplementary material goods. Likewise, other ecosystem services such as the cleaning of air and water, sustain life and strengthen resiliency in the face of growing pressures. To avoid and halt the deprivation of such ecosystems, many countries are sustainably managing their forests, protecting sites critical to biodiversity and performing national conservation legislation and policies; however, other opportunities are being missed. COVID-19 was a prospect to incorporate biodiversity concerns into economic recovery measures and assemble a further possible prospect; however; biodiversity has been principally ignored in recovery spending (UN, 2022a).

THE IMPACT OF DIGITAL AND COVID-19 EXTERNALITIES ON SDG 16

This section explains the externalities implications of digital technology, COVID-19, world conflicts and natural disasters on peace, justice and institution building (SDG 16) that were not included in MDGs. SDG 16 promotes peaceful and inclusive societies for sustainable development, provides access to justice for all and provides for the building of effective, accountable and inclusive institutions at all levels around the world.

SDG 16 brings together the sides linked to peace, justice and inclusion, as well as combating corruption. Nevertheless, global progress concerning this goal appears to have stalled, chiefly due to existing conflicts such as the war in Ukraine and large-scale global wars, where 2022 documented more civilian deaths and displacement.

Accompanied by these crises, and notwithstanding movement restrictions brought about by COVID-19, pushed displacement has continued and even expanded. The United Nations SDGs Report 2022 states that ending armed conflicts, strengthening institutions and performing inclusive and equitable legislation that protects the human rights of all persons are necessary preconditions for sustainable development (UN, 2022a).

Well-developed institutions employing the rule of law and governance supported by rational leadership will play a focal position in sustaining justice. These well-governed institutions will enhance sustainable economic growth through their essential services such as education, health, and savings and investment, among other services.

THE IMPACT OF DIGITAL AND COVID-19 EXTERNALITIES ON SDG 17

This section explains the externalities implications brought by digital technology, COVID-19, world conflicts and natural disasters (SDG 17) that were not included in MDGs. SDG 17 expresses partnerships for the goals, and co-ordinates the implementation of all 16 SDGs. SDG 17 strengthens SDGs means of implementation and revitalises global partnerships for inclusive sustainable development.

SDG 17 (Partnerships for the goals) is the last goal of the UN Agenda 2030; it aims to bring the world together in public and private partnerships to achieve the other 16 SDGs. SDG 17 is the goal most affected by the existence of digital technology due to the emergence of the Fourth Industrial Revolution (IR 4.0) that took the world by surprise as it appeared before the completion of the Third Industrial Revolution. The partnership became mainly a smart rather than conventional partnership for which most countries are not ready. Immediately after the appearance of IR 4.0, the COVID-19 pandemic began, requiring digital transformation and digital skills to conduct obligations, and the world locked down completely for more than two years. In this respect, the UN SDGs 2022 report states that several developing countries struggled to recover from the negative externalities of COVID-19, despite a high level of official development assistance (ODA) and a robust reverberation in global foreign direct investment (FDI) and remittance movements. Among other challenges, developing and developed nations struggled with high levels of inflation, climbing interest rates and looming debt obligations. With competing priorities and limited fiscal space, many found it harder than ever to recover economically. To develop reverse capability from COVID-19 and rescue the SDGs, a complete transformation in general, and digital transformation and digitisation in particular, of the international financial system and

debt architecture is required to overcome the negative implications of COVID-19 and put the world economy back on track. Finally, the world is confronting a multiplicity of crises throughout the social, health, environmental and peace and security areas. There is a need to find permanent solutions via applying SDG 17 aiming at international cooperation, collaboration and partnerships to achieve the Agenda 2030 in the remaining six years.

DISCUSSION

The World Bank 2021 report showed that prior to the pandemic, the statistical capability to produce and commendably utilise essential economic and social data was insufficient. Several poorer economic countries were unable to accurately pursue public funds or assess their development targets, and had exposure to external debt. Without such data, they lacked the ability to comprehend which procedures were accountable and look for development deficiencies; in addition, data governance arrangements for the use of countless data, including guarding against misuse of data, are still in their infancy. The legitimate and governing frameworks for data are insufficient in lower income countries; all too often, these countries have gaps in their knowledge of crucial protections and have deficiencies of data distribution procedures. The data structures and infrastructure that allow interoperability and permit data to flow to more users are inadequate. In this respect, 20% of low and middle-income countries have contemporary data infrastructures, such as colocation data centres and direct access to cloud computing facilities. In the same countries, the Department of Statistics composed data via annual surveys. Even where encouraging data systems and governance frameworks exist, an absence of institutions with the necessary administrative capability, decision-making sovereignty and financial assets holds back their effective operation and enforcement. To address these problems, the World Development Report 2021 seeks a new social contract for data to license procedures and the re-use of data to produce economic and social value. This will show people that they will gain advantages from the use of the data, and that the data will not be misused in any way (World Bank, 2021). However, in examining such a social contract, lower-income countries are then often disadvantaged; at the same time, they require the infrastructure and talents to seize data and drive them into increasing value. It should be noted that there are measures and organisations in place that participate legally in comprehensive data marketplaces and their governance, and the institutional and supervisory frameworks to construct confidence in data organisations.

Agenda 2030 for Sustainable Development includes an ambitious set of 17 goals and 169 targets. Since its adoption, through its Action Plan on SDGs, the OECD has committed to being the United Nations' "best-supporting actor" in promoting the achievement of the goals. With less than 10 years to go, strong policy actions are needed to fulfil the entire 2030 Agenda. So far, the OECD area has met, or is close to meeting, one-quarter of the targets for which performance can be evaluated.

In a report published in 2022, the Bill and Melinda Gates Foundation assumed that all the 17 SDGs prepared by world leaders in the UN in 2015 would not be met unless innovative solutions were developed (Gates and Gates, 2022). The new challenges were a result of the externalities brought about by the digital revolution, COVID-19 and global conflicts; if not met with new innovations, some goals, such as gender equality, goals concerning health and pandemics, would not be met until three generations later than predicted. The world needs to accelerate its rate of progress by five times to meet most of the SDGs. The report, titled The Future of Progress indicated that at present, midway, it is doubtful the world will meet even a handful of the targets set (Gates and Gates, 2022).

Furthermore, progress towards the 2030 Agenda targets has been affected by the COVID-19 pandemic. The pandemic influenced the health of millions of people worldwide; it also had an indirect effect on many other dimensions of health, and revealed and expanded weaknesses in healthcare systems. In addition to the countless deaths, the economic crisis induced by the pandemic was significant and its consequences on job prospects, education and living standards will be felt for a long time. The pandemic also challenged institutions and put all sources of public financing under pressure; it also highlighted the impact of human interference on the environment. The reduction in economic activity due to efforts expended to combat the COVID-19 pandemic led to a temporary improvement in environmental conditions. It also allowed policy-makers to revisit the role of macro-economic policies. Having learned lessons from the 2008 global financial crisis where, in many countries, fiscal stimulus was too limited and turned contractionary too early, the speed and scale of the fiscal response to the COVID-19 crisis was unprecedented. The momentum from the strong rebound after reopening the economy slowed in many countries amidst persisting supply bottlenecks, rising input costs and the long-term effects of the pandemic. The COVID-19 pandemic has not been the only disruption to lives and livelihoods in recent times. Climate change is an existential threat. More recently, Russia's war against Ukraine and large-scale wars and conflicts around the globe have devastated the lives of individuals directly affected and raised central queries about democracy, global security and the reliability of global food and energy supplies.

Progressing Towards Achieving SDGs Targets

While the findings mentioned above clearly point to the need for stronger action in the six years remaining until 2030, there are still blind spots in our understanding of where countries stand on SDGs. Despite the significant statistical and measurement efforts by national and international agencies, gaps within the SDG global measurement framework are significant; this is true even for OECD countries, whose statistical systems are among the most developed in the world. Overall, available data on the levels of the various indicators make it possible to cover 136 of the 169 global targets underpinning the 17 SDGs, but there are large disparities between the 17 goals. For instance, at least 20% of the targets for the goals relating to Food and hunger (SDG 2), Gender equality (SDG 5), Life below water (SDG 14), Sustainable cities (SDG 11), Peace, justice and institutions (SDG 16) and Partnerships for the goals (SDG 17) cannot be monitored properly. With less than 10 years to go, strong policy actions are needed to fulfil the 2030 Agenda. On the bright side, so far, the OECD area has met or is close to meeting 28 of the 112 targets for which performance can be measured. These achievements relate to securing basic needs and implementing policy tools and frameworks for the SDGs. The latter shows a significant commitment by OECD countries to mainstream SDGs in their policies. However, the outcomes of such approaches are yet to be fully seen, as shown by the insufficient progress made on ensuring no one is left behind, restoring trust in institutions, and limiting pressures on the natural environment (OECD, 2022a).

Climate Change and COVID-19 Challenges

Unchecked, any major future challenges, including climate change and biodiversity loss but also population ageing, digital transformation and widening income inequality, could have social and economic impacts far greater than those caused by the COVID-19 pandemic. The huge public investment plans that have been rolled out since the onset of the crisis are key to upgrading critical infrastructure, making progress concerning the green transition, bridging the digital divides and avoiding and mitigating forthcoming shocks. In the European Union (EU), for example, the Recovery and Resilience Facility (RRF) comprises commitments to invest in a wide range of topics covering many different areas that lie at the heart of Agenda 2030, comprising not only green and digital transitions but also inclusive growth or social cohesion.

Moreover, the COVID-19 pandemic has not been the only disruption affecting people's lives in the current period. In recent years, there have been massive wildfires

(e.g., in Mediterranean countries in 2019, in Australia in 2019 and 2020, and California in 2020), extraordinary heatwaves and droughts (such as in Western North America in 2021 or in Europe in 2022), and extreme cold weather and damaging floods (including in Germany, Belgium and western Canada in 2021). All have caused thousands of fatalities, major destruction of property, and disruption of economic activities. Such storms, together with other weather-related disasters, have become more regular and severe due to rising sea and air temperatures (OECD, 2022b; Masson-Delmotte *et al.*, 2021; Collier *et al.*, 2022; WMO, 2021).

The observational threat of climate change and the interlinked biodiversity crisis will have multiple impacts far beyond the frequency and seriousness of dangerous climate incidents. For instance, while the origin of the pandemic is still to be understood, deforestation, natural habitat degradation and fragmentation, agricultural intensification, wildlife trade and climate change are all playing a role in the development of zoonotic diseases and many deadly pathogens in recent memory - Ebola, HIV, Dengue, SARS, MERS, Zika, West Nile - have made this interspecies leap (OECD, 2022b).

The Global Large-Scale Wars

At the beginning of 2022, a war broke out in Europe via a large-scale conflict between Russia and Ukraine; there are also other wars and conflicts around the globe. This set up an immediate danger to peace and stability on the continent and put the most fundamental human rights at risk as the war is by proxy. In addition to the humanitarian crisis caused by the wars, these wars and conflicts likewise breed despair over the economic and social prospects to all the individuals around the world.

The Russian-Ukrainian war divides the world and threatens SDG 17 partnership and collaboration between the countries to implement the SDGs. It has also created a shortage in energy and food supply and other economic crises in the world economy.

Furthermore, the war endangered the world's economic resurgence following the COVID-19 pandemic's negative externalities implications through the creation of inflation, food security, lack of energy security; further supply-chain gravities have occurred in connection with, or have been aggravated by, the war. While Russia and Ukraine are large-commodity exporters, the war has caused rises in the price of energy and food, making life significantly more difficult for numerous populations throughout the globe. The level to which growth will be lower and inflation higher will depend partly on exactly how the war develops; however, not only the poorest will be hit hardest around the world (OECD, 2022a).

Beyond Pure Data Availability

Data gaps in both developing and OECD countries, become fundamental when concentrating on SDGs indicators measuring countries' SDGs performance over time. The origin of the data gap is the research gaps; these lost their meaning and purpose, to give the ability to maintain jobs in international regional organisations and academic institutions, among other research partners. Secondary data would normally be generated from the primary data collected in partnerships between individual countries' Departments of Statistics and other agencies, regional and international organisations, research and academic institutions and private sector research and development centres. Consequently, data are lacking to enable progress to be tracked on at least 60% of the targets under 7 of the 17 goals. Four of these goals are in the Planet category – Responsible consumption and production (SDG 12), Climate action (SDG 13), Life below water (SDG 14) and Life on land (SDG 15) – the others are Gender Inequality (SDG 5), Sustainable cities (SDG 11) and Partnerships for the goals (SDG 17), as indicated by the SDGs report 2022 (UN, 2022a). Beyond pure data availability, various other statistical gaps influence the progress concerning 2030 Agenda. In this respect, data obtainability is one of the most noticeable problems mounting in the approach of a further vigorous estimation of the progress commanded by countries in meeting their obligations under the 2030 Agenda. Added statistical gaps, such as timeliness or granularity, can further be deliberated on in this 2030 Agenda assessment. For instance, given the lag in available data, the effects of the COVID-19 pandemic on existing distances and paths are not entirely revealed in accessible approximations.

Capacity to Track Progress Towards the SDGs

Confirming that all countries have the capacity to track progress concerning the SDGs is essential for the accomplishment of the whole 2030 Agenda. Data gaps through the research gap influence our understanding towards the 2030 Agenda progress. In this respect, the progress of 2030 Agenda around the world is not completely understood; this might lead to biased conclusions regarding countries' reporting of their SDGs achievements. There are doubts that the SDGs reporting framework is complete and valid; it is felt that the framework should be revised and modified to accommodate the shortcomings created by the digital revolution, COVID-19 and wars and conflicts around the world. The framework will not be up-to-date or could miss important segments of the lagged population, and any interpretation about what the correct policies are risks being imperfect. The equivalent is valid if analytical instruments cannot deliver an inclusive evaluation of the greatest recent tendencies – exclusively in

the times of ambiguity the world is confronting. Further, preliminary research, which inclines to confirm preceding work concentrating on MDGs, shows that countries' performance on measuring progress is positively associated with actual progress towards the goals (Jacob, 2017).

CONCLUSIONS AND IMPLICATIONS

The United Nations (UN) 2030 Agenda and its Sustainable Development Goals (SDGs) are a global call action to end poverty, protect the earth's environment and climate, and ensure that people everywhere can enjoy peace and prosperity. These 17 SDGs are the goals of the UN 2030 Agenda that, in 2015, replaced the unfinished business of the 8 Millennium Development Goals (MDGs), mainly due to financial sources shortages. This study's aim has been to assess and review the SDGs in light of digital technology brought by the digital revolution introduced by Industry 4.0, the so-called Fourth Industrial Revolution (IR 4.0), innovation and climate change integration, and the implications of COVID-19, global wars, conflicts and natural disasters on achieving the 2030 Agenda, to sustain economic growth and development around the world.

SDG 17 (Partnerships for the goals) is an important goal of the UN Agenda 2030 and should bring countries together in public and private partnerships to achieve the SDGs in the six years remaining to accomplishment the SDGs targets. SDG 17 is the goal most affected by the emergence of digital technology of IR 4.0. IR 4.0 took the world by surprise as it appeared before the completion of the third industrial revolution. A smart partnership is complimentary to conventional partnerships as many countries are not capable of embracing digital technology applications in all economic sectors, and most individuals do not have the digital skills required to facilitate economic activities. Immediately after the challenges presented by the digital revolution, the world saw an extraordinary pandemic (COVID-19) that required digital transformation, digitisation and digital skills to conduct responsibilities as the world locked down completely for more than two years. Furthermore, among other challenges, developing and developed nations are struggling due with high levels of inflation, climbing interest rates and looming debt obligations, partly brought about by the wars and conflicts throughout the world. Through competing priorities and limited fiscal space, many countries are finding it harder than ever to recover economically from the negative externalities generated by the above-mentioned issues. To develop reverse capability from COVID-19 and rescue the SDGs, a complete transformation in general, and digital transformation and digitisation in particular, of the international financial system and debt architecture are required to overcome the negative implications of COVID-19 and

put the world economy back on track. Finally, the world is confronting a multiplicity of crises throughout social, health, environmental, and peace and security areas. There is a need to find permanent solutions through applying SDG 17 aiming at international cooperation, collaboration and partnerships to achieve Agenda 2030 in the remaining six years.

The large-scale wars between Russia and Ukraine and other countries around the world is an immediate threat to peace and stability and sets the most fundamental human rights in danger. Beyond the humanitarian crisis that the wars cause, these conflicts also cast dark shadows over the economic and social prospects far beyond the European continent to almost all countries in the world. War endangers the world's economic recovery from the COVID-19 pandemic and cause inflation, lack of food security, energy security and further supply-chain pressures. While Russia and Ukraine are large-commodity exporters, the war has caused the rise of energy and food prices, making life more difficult for many people throughout the world. The extent to which growth will be lower and inflation higher will depend comparatively on how the war develops. Not only the poorest will be hit hardest; most individuals around the globe will be negatively affected by the consequences of war (OECD, 2022a).

The COVID-19 pandemic has not been the only disruption affecting our lives. There have been huge wildfires (e.g., in Mediterranean countries in 2019, in Australia in 2019 and 2020 or in California in 2020), unprecedented heatwaves and droughts (such as in western North America in 2021 or in Europe in 2022), and extreme cold weather events and destructive floods (including in Germany, Belgium and western Canada in 2021). All have caused thousands of fatalities, major destruction of property and disruption of economic activity. Such storms, together with other weather-related disasters, have become more frequent and severe due to rising sea and air temperatures (OECD, 2022b; IPCC, 2021; WMO, 2021). These pandemics and natural disasters require the UN to revise its Agenda 2030 to include the shortcomings generated by digital technology innovations required to overcome the disasters. There is also a need to incorporate innovations into reducing climate change to solve the negative externalities caused by emissions to solve the problems of climate change and achieve the SDGs targets by 2030.

In the meantime, SDG 16 (Peace, Justice and strong institutions) is the priority goal for Ukraine, Sudan and the countries experiencing large-scale war. These countries have experienced institutional failure via the implementation of the peace agreements and restructuring of government institutions, including the implementation of good governance and rule of law needed to build these countries. In light of the digital revolution

and IR 4.0, there is an urgent need to transform these and other economies around the world into a sustainable digital economy; this should be achieved through developing the national digital economy flagships and pillars needed to apply the economic plans. Other SDGs should be planned and implemented to develop these economies into a sustainable digital economy such as providing education and health services, a conducive environment for saving and investment, research and development, innovation, public utilities and other goals to transform the sectors of the economy.

Further, data gaps become even starker when focusing on indicators measuring performance over time. Therefore, data are lacking to track progress on at least 60% of the targets under 7 of the 17 goals. Four of these goals are in the Planet category – Responsible consumption and production (SDG 12), Climate action (SDG 13), Life below water (SDG 14) and Life on land (SDG 15); the others are Gender Inequality (SDG 5), Sustainable cities (SDG 11) and Partnerships for the goals (SDG 17). Beyond pure data availability, other statistical gaps influence the understanding of progress towards the 2030 Agenda. Data availability is one of the most salient challenges standing in the way of a more robust assessment of the progress made by countries in meeting their commitments under the 2030 Agenda. However, other statistical gaps, such as timeliness or granularity, also weigh heavily on this assessment. For instance, given the lag in available data, the effects of the pandemic on current distances and trajectories are not fully reflected in available estimates.

The same is true if diagnostic tools cannot provide a comprehensive assessment of the most contemporary trends, especially in the times of uncertainty the world is facing. In addition, preliminary research, which tends to confirm earlier work focus on the Millennium Development Goals (MDGs) (Jacob, 2017), suggests that countries' performance on measuring progress is positively associated with actual progress towards the goals. Tracking SDG performance requires high-quality data and a comprehensive monitoring framework. Implementing and monitoring progress towards the SDGs is challenging. The targets are universal, applicable to all countries and focus on more than problems related to development. Many of them are complex, interlinked and multifaceted, requiring new concepts and measures. A strong multilateral system is still key to addressing today's most critical challenges. The world is more interconnected than ever due to increasing globalisation and enhanced technological progress.

Ensuring that all countries have the capacity to track progress towards the SDGs is critical for the overall success of the 2030 Agenda. Data gaps influence our understanding of progress towards the 2030 Agenda; not carefully understood, they may lead to biased conclusions. If the SDGs' reporting framework is incomplete, not

up-to-date, or misses important segments of the population, any inference about what the good policies are risks being flawed. In this respect, the SDGs' reporting framework should be refined to accommodate digital technology innovations and climate change integration, COVID-19, global wars, conflicts and natural disasters externalities requirements to modify, capture and report inclusive information regarding SDGs Agenda 2030 accomplishment in the remaining six years.

STUDY LIMITATIONS AND SUGGESTIONS FOR FUTURE STUDIES

This study is limited to a descriptive review analysis based on the review of the undertaken SDGs reports and studies to highlight the revision of the SDGs reporting framework to accommodate the shortcomings created by the digital revolution innovation and climate change integration, COVID-19, universal wars, conflicts and natural disasters externalities' shortcomings implications on most of the 17 SDGs.

Future studies can fill this gap via empirically examining these externalities' shortcomings through employing available data to help the concerned parties to revise Agenda 2030 to overcome the drawback of these externalities' shortcomings to speed up the implementation of SDGs and achieve them by 2030 as planned.

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