Chapter 3
Taking Steps to Help the Phoenix Rise from Ashes: A Roadmap for Digital Enterprises to Develop New Sustainable Goals

HO Minh-Nhat, Jana Majerova, and Subhankar Das

Introduction

Enterprises rely on technological inputs to fight against COVID-19. From drug development to forecasting its spread, the tools of A.I. were used to address the various aspects of the epidemic. This report catalogs the multiple uses of A.I. in the pandemic, and it identifies the ethical and human rights concerns raised by these applications. This chapter aims to inform the public about the various uses and policies related to these new-age techniques in future. This chapter describes the various new technology applications used during the fight against COVID-19. There is no consensus on the type of applications that were studied.

For the recovery of the global economy to be more productive, it must avoid getting back to pre-COVID-19 time and avoid taking on more environmental risks. Unchecked environmental emergencies could cause significant economic and social damages (Mondal et al., 2022). The recovery packages must be planned for recovery. Mere getting people back to work can help stop further economic damage (Tiwari & Mondal, 2022). The recovery policies should also trigger behavioral changes that will help prevent future shocks. A recovery package should also consider the various

HO Minh-Nhat
Department of Science and Technology, Ho Chi Minh City Government, Ho Chi Minh City, Viet Nam
e-mail: hmnhat.skhcn@tphcm.gov.vn

J. Majerova
Department of Economics and Management, AMBIS University, Lindnerova 575/1, Prague, Czech Republic
e-mail: jana.majerova@ambis.cz

S. Das (✉)
Institute of Development Economics Research, University of Economics, Ho Chi Minh City, Viet Nam
e-mail: subhankardas@idr.edu.vn

S. R. Mondal et al. (eds.), *Sustainable Development and Innovation of Digital Enterprises for Living with COVID-19*,
https://doi.org/10.1007/978-981-19-2173-5_3

factors that affect people's well-being. These include climate impacts, sustainable development goals, and intelligent logistics (Mondal & Das, 2021). A thoughtfully planned recovery can help address these points particularly (Sharma & Das, 2021). It can stimulate the uptake of low-carbon mobility systems and improve the efficiency of electricity distribution.

The pandemic that hit the world at fag end of 2019 and early 2020 accelerated the digital transformation of society. During the pandemic, many people started working from home. They also began attending classes remotely. As the pandemic reached the global stage, various apps were developed to help track its development. A.I. was also utilized to study the virus. Immediately after the pandemic, Internet traffic increased in some countries. While the digital transformation has shown great potential, it has also highlighted the various remaining gaps. The increasing reliance on digital solutions has raised concerns around security and privacy. The pandemic has shown how digital technologies can augment the effectiveness of traditional medicine. It is also unlikely that society will return to its pre-COVID times. As the world becomes more dependent on digital technology, ensuring that its widespread and effective use can create a level playing field is critical. This chapter explores the various ways in which governments are increasingly focused on digital strategies. Following the pandemic, it is now time for countries to build comprehensive digital transformation plans that will help bridge the divide between the developed and underdeveloped regions. Figure 3.1 represents the new everyday sustainable development goals (SDGs) where technology use is paramount and proactive for the betterment of digital enterprises.

Widespread Use of Technology for Maintaining Connectivity During COVID-19

Pandemic has increased digital accessibility and engagement and the use of tech in dynamic ways (Das, 2021a). Although some people may choose to stay home while taking COVID-19 drugs, it is still expected to have a high impact on e-commerce and e-health. The rise of COVID-19 has also raised the pressure on firms to establish high-quality connectivity. As governments consider their responses to the increase of digitalization, they should keep in mind that it could create new digital segments worldwide. There was a significant increase of more than 95% of adults who used the Internet in 2020–2022 as comparable to 2018–2022 (OECD, 2020a). Despite the uptick in usage, the share of people aged 50–74 who use the Internet daily remained low compared to the average age of daily Internet users (OECD, 2020b).

There are still skills gaps in various countries and demographic groups when it comes to using the Internet. People with higher skills can exploit these gaps. The digital gender divide is still an essential issue for addressing (OECD, 2020c). Women are more likely to experience frequent stress due to exposure to computers (Siri & Das, 2021), while men are more skilled in digital-intensive sectors. Before COVID-19, the total e-commerce market was booming worldwide, but during the pandemic,

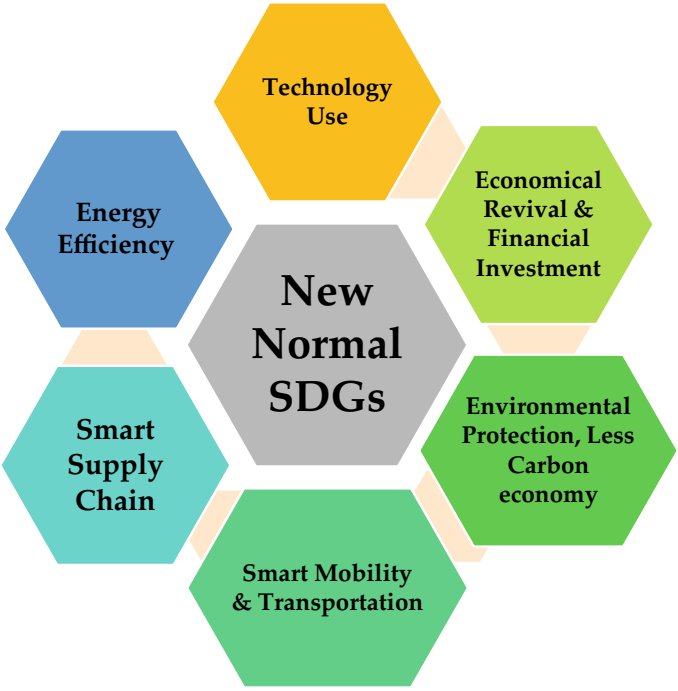

Fig. 3.1 New normal SDG and digital enterprises (*Source* Authors' conception)

e-commerce has developed a more significant gap between small and large enterprises operating in this domain (Ravi & Mondal, 2021). Digital technology and its diffusion are also widening due to COVID-19. For instance, e-commerce had become the primary mode of turnover for many firms in the OECD before the pandemic (OECD, 2020d). Despite the rise of big data, it remains a desirable scenario across different sectors and countries (Duman & Das, 2021).

Government Prioritizes Digital Transformation (DX) to Build a Sustainable Future

Before the COVID-19 pandemic, many governments have strengthened their digital transformation strategies. They are now focusing on using A.I. and 5G infrastructure to support the development of new applications and devices. Over 60 countries have a national A.I. strategy by mid-2020, and several OECD countries have issued 5G strategies in the last three years (OECD, 2020a, 2020b). Several countries, such as Australia, China, Germany, and Switzerland, have started developing blockchain

strategies. The virtuous circle between digital transformation and innovation is significant for countries struggling with COVID-19 (OECD, 2020c). Despite the potential risks posed by these technologies, many countries still believe that their use should not be limited to commercial interests. The signing of the OECD A.I. Principles encourages other countries to develop trustworthy technologies (OECD, 2020d).

The digital transformation trend is encouraging, but it may not be enough to ensure a more inclusive and resilient future (Yegen & Mondal, 2021). The COVID-19 crisis has reinforced the need for a coordinated whole-government approach to digital transformation (Das, 2021b). The framework aims to put a set of policies that will help shape a shared digital future. It features seven essential building blocks: access to digitalization, use of technology, digital innovation, trust in stakeholders, jobs, society, and an open market economy.

Access to digitalization: The rise of digital connectivity has become an essential part of businesses, schools, and society. It has reinforced the importance of having robust data governance and communications infrastructures.

Use of technology: As more people and firms adopt digital technology, governments must step up their efforts to ensure that everyone is equipped with the necessary skills to succeed in the digital economy (Sharma et al., 2020).

Digital innovation: It is a crucial driver of digital transformation. It can stimulate new business models and provide opportunities for public sector efficiency gains.

Trust on stakeholders: Following the rise of digital tools following the COVID-19 pandemic, more attention is needed to ensure that consumers and businesses trust the digital environment. Exploits targeting victims of the pandemic caused by the lack of trust in the digital realm became more prevalent.

Jobs: The rise of digital technology has already changed the way people work. It has raised concerns about what the future holds for employers. The pandemic has raised concerns about a lot of many jobs. It has also led to an increase in teleworking. As the economy continues to recover from the crisis, policymakers will need to look at the various regulations and structures that apply to the labor market.

Society: As people spend more time online, governments should step up their efforts to support well-being. They should also address the various social issues that arise from the digital transformation.

Open market Economy: The rise of tech companies has raised concerns about market fragmentation and its impact on SMEs and start-ups. The COVID-19 crisis highlighted the concerns about market consolidation, as tech companies have become more influential in our lives. As the number of companies offering online services decreases, governments must consider the impact on society.

After the global pandemic spreads its fangs across the globe, governments started implementing emergency measures designed to support recovery efforts. As the pandemic began to abate, they shifted their attention to preparing stimulus plans to stimulate the economy (Environmental Health and Strengthening Resilience to Pandemics, 2020; Fraccascia et al., 2019). This chapter aims to determine how these stimulus packages can help build a stronger and more resilient recovery to future shocks. It also addresses the various factors that will help improve our long-term stability. This approach aims to create a more inclusive and resilient society by

transitioning to a low-carbon economy. This chapter focuses on sustainable development after COVID-19. Data analytics enabled us to analyze the environmental sustainability of various projects.

A robust, strong economy aligns sustainable processes adopted across various regions and sectors. In this section, we will discuss some of the most critical issues that will affect the development of a sustainable digital economy.

COVID-19 Effect on Job Sector and Economy

The COVID-19 pandemic has highlighted various threats to our economies and societies. For decades, interconnectedness has helped create various social and economic benefits (Mondal, 2020a). However, it also led to the rapid spread of the pandemic (Das, 2020a). The depth and speed of the global economic crisis revealed the importance of focusing on short-term economic growth over long-term resilience (Agba et al., 2020; Das, 2021c). The massive loss of employment highlighted the rise of social inequality. It is estimated that over 300 million jobs could be at risk. Despite the crisis, the public's awareness of the various frailties has been raised.

The global economy's vulnerability is most alarming when viewed in light of the existential threat posed by climate change. Numerous factors such as climate change, air pollution, and biodiversity loss (Mondal, 2021) have already affected the global economy. Climate change is already causing physical and economic impacts globally. In some regions, such as Bangladesh, Philippines extreme weather events have already occurred at the same time as efforts to address COVID-19 (U.N., 2020). Without structural changes, the accumulation of greenhouse gases in the atmosphere will lead to more catastrophic impacts (Duy et al., 2020). Although the government's shutdown has led to positive environmental improvements, these will have a long-term effect (Le Quéré et al., 2020; Van et al., 2020). If the economy begins to recover from the global financial crisis, it will likely disappear quickly. This is evidenced by the uptick in greenhouse gas emissions (OECD, 2020a). The interrelated environmental concerns could have catastrophic impacts on society. It is believed that the loss of biodiversity and the destruction of the ocean's health could lead to the development of zoonotic viruses that can infect humans (García et al., 2020). Air and water pollution can affect the well-being of people and communities.

Not being able to sustain a long-term economic recovery will affect individuals and businesses and contribute to inequality and improve well-being. As governments and businesses begin implementing massive stimulus packages, it is also essential that we step back and reflect on the factors that caused the current crisis. Despite the encouraging signs, recovery plans have mostly fallen short. For instance, in 2020, the G20 Finance Ministers committed to supporting an inclusive and sustainable recovery (Siri et al., 2020). A poll conducted in 2020 indicated that most citizens believe that environmental issues are still a top priority after the global pandemic that affected developing and developed nations (4th G20 Finance Ministers and Central Bank Governors Meeting, 2021; Singh et al., 2020).

The rising concerns about the environment also became a political issue. In 2019, millions of people marched in the streets in support of climate action, which led to numerous governments declaring a climate emergency (Stainback et al., 2020). Climate change and biodiversity loss became the main factors considered by the World Economic Forum in 2020 (Smirnov, 2020). Despite this, the organization still believes that a resilient and sustainable recovery is best to address these issues. There is also widespread support for green technologies and industries, but this is affected by new normal industrialization that can absorb and lock greenhouse gas efflux (Chen et al., 2020).

Revival of the Economy like the Phoenix from Doldrums of COVID-19

The "building back better" is used to describe the recovery from COVID-19. The concept of building back better emerged from the context of disaster recovery (Brown, 2021). Its goal was to improve the resiliency of communities and reduce the costs of future disasters (Sharma & Das, 2020). The challenge of rebuilding the global economy after COVID-19 is different from that of a physical disaster (Draper et al., 2021). Despite the economic crisis, the risks associated with a more sustainable recovery are still significant. Even at the global level, efforts to prevent disasters are still focused on prevention. The changes that were made during the crisis can help minimize future risks.

For building back better, enterprises should consider recovery measures. Doing so can expose areas where competing stimulus plans may provide similar near-term benefits but have different long-term goals. For instance, assessing the long-term goals of other stimulus plans can reveal areas where different policies may offer additional near-term benefits but have different long-term goals. A reconciliation phase of recovery that focuses on well-being and inclusivity is needed to improve the conditions of society. Policies should also address other elements of well-being, such as education and employment, to improve the public's confidence in the recovery. A stimulus package that focuses on people's well-being is also crucial to achieving environmental goals (Gruère & Brooks, 2021). Policymakers should adopt progressive taxation and subsidies to ensure that environmental policies are socially inclusive (Palmer et al., 2020).

The relative importance of various dimensions to different country contexts will vary depending on their development priorities and social circumstances. These dimensions are discussed as follows.

a. Supporting recovery measures designed to reduce greenhouse gas emissions is essential in addressing climate change. Doing so should avoid the worst impacts of climate change. The long-term effects of infrastructure projects supported by stimulus packages are expected to have implications for decades. This

chapter focuses on the long-term structural and near-term impacts of supporting economic activities that receive liquidity support.

b. Climate change resilience is a crucial aspect of addressing the impacts of climate change. Enterprises use infrastructure investment as a vital component of these efforts to stimulate recovery efforts. However, it is essential that these projects are climate-resilient and do not increase vulnerability (Das, 2020b). Climate change will significantly impact society, especially in terms of infrastructure networks. New infrastructure investments need to consider their climate risk management strategies. This strategy aims to reduce the direct economic damages caused by climate change disasters (Mondal, 2020b) and minimize the indirect costs (Nadanyiova & Das, 2020), caused by their effects.
c. The fight against biodiversity loss is an integral part of human health and the economy. Land-use change and deforestation are threatening the stability of ecosystems. Investment in reforestation and other natural infrastructure projects can help improve the resilience of ecosystems to climate impacts. Stimulus packages should integrate the value of biodiversity and ecosystem services into their decisions. There are also crucial steps that governments can take to improve the management of their support for biodiversity. It can help improve the resilience of various environmental health dimensions.
d. Fostering innovation is a critical component of achieving sustainable development goals. It builds on the momentum of previous actions and helps develop new processes and technologies. The COVID-19 pandemic has raised concerns about the impact of cultural norms and behavior changes. It should be considered when formulating stimulus packages. For instance, addressing the reluctance to use public transport can help minimize crowding and improve the cleanliness of streets. It can also encourage people to use other transport modes such as remote working.
e. The pandemic has raised concerns about the resilience of global supply chains. It has also prompted a renewed interest in using shorter and more diversified supply chains. Although the environmental impacts of this shift are not yet clear, policies should be put in place to support local supply chains in improving their environmental performance.

The U.N.'s Sustainable Development Goals are a set of goals that aim to promote social development and well-being. Through stimulus packages, these actions can help improve the resilience of communities and put in place policies that will promote recovery. Doing so can help avoid repeating the mistakes of the past, which often lead to the development of ineffective stimulus measures. Although greenhouse gas emissions have increased, the effects of climate policies are still relevant. There's also a need to improve the circularity of materials used. There are also vital lessons that can be learned from implementing environmental measures in response to the 2008 financial crisis (Avelé, 2021).

Recovery Phase and Environmental Protection Policies for Different Digital Enterprises

This section highlights various opportunities for public stimulus spending to improve the efficiency of multiple sectors. These examples are relevant to where the stimulus program can catalyze systemic change in the economy and provide employment. This section is also applicable to situations where the stimulus program can trigger changes in the economy that are needed to support long-term resilience outcomes.

a. Biodiversity enhancement and environment protection.

   Forests and other natural infrastructures such as parks and marinas are integral to millions of people's economic activities. Unfortunately, most of the natural capital is not being used to its fullest potential and is only valued as a commodity. The unpriced natural capital of various primary processing sectors, such as forestry, mining, and steel, was valued at over USD 10 trillion in 2019. Although some policies have been introduced to value biodiversity, most existing approaches to value natural capital loss (Mohanty et al., 2019) are still limited. Recovery packages can help governments and private investors increase personal finance for nature-based solutions. They can also encourage financial instruments to measure and manage biodiversity impacts.

b. While the concept of building back better doesn't seem to have many concrete solutions, governments can implement some key recommendations to improve their infrastructure. The digital enterprise and its functionaries must.

   Restrict and screen all elements of the stimulus packages for their longer-term implications. The leaders of enterprises can,

   1. Negotiating stimulus packages that are both beneficial and resilient can help avoid locking-in emissions from infrastructure and systems.
   2. The stimulus packages can be quickly implemented, especially for digital enterprises.
   3. Cross-government initiatives can help avoid duplication and provide long-term systemic benefits.

c. Build a pipeline of sustainable infrastructure projects ready to be implemented quickly. Quickly implemented tasks can help avoid using up resources and make new emissions-intensive activities happen.

d. Ensure that policies and investments are aligned with long-term environmental objectives. It includes ensuring that policies and investments are aligned with the goals and conditions of the stimulus packages.

   1. Doing so will provide short-term relief, while the short-term economic benefits outweigh the long-term costs.
   2. Support for specific industries that improve their environmental performance is conditional on achieving these goals.
   3. Coordinate the phasing out of fossil-fuel subsidies (Behera et al., 2019) and the building of carbon pricing to create a coherent energy pricing system.

e. Reinforce the importance of green finance in supporting digital enterprises' resilience and financial decisions.

   1. Measuring the consistency of financing and climate change mitigation for businesses will help build resilience and minimize risk (Buchholz & Rübbelke, 2020).
   2. We are establishing robust and transparent standards for green finance (Gupta et al., 2019).
   3. It will help guide investment decisions.
   4. Public finance can help stimulate private investment by increasing the number of public finance institutions that can co-invest.
   5. This strategy aims to improve the capacity of financial institutions to manage and disclose climate change-related risks.

f. Design processes that promote low-carbon procurement and resilience. For example, consider the costs associated with climate change when bidding for assets. Support industries are experiencing immediate crises and long-term decarbonization (Farooque, 2021).

g. The food sector is a vital part of the economy, and its supply is essential for the survival and growth of communities. A secure food supply is also critical to economic stability and well-being. Food security is also likely a top priority for governments as the crisis proceeds. During the recovery, food security is expected to be a top government priority (Singh, 2020).

h. The agriculture sector faces various threats such as climate change and the spread of diseases. Land-use change is considered one of the main factors that contribute to deforestation. It is also responsible for the excessive use of fertilizer. The intensification of agriculture can also contribute to the spread of pathogens across species. It can also cause biodiversity losses and increase the risk of human diseases. Expanding agricultural areas near wilderness areas can also increase the chances of zoonotic transmission of pathogens (López-Lozano & Baruth, 2019).

i. In 2019, farmers in 53 countries received support from their governments. These policies were focused on supporting rural businesses and ensuring that they could maintain their profitability and minimize supply disruptions. As the climate change impacts intensify, there is a need to reform the most harmful and distortive policies, such as production and environmental regulation. These regulations could prevent food systems from transitioning to sustainable practices. Through training and investments, farmers can transition to a sustainable agriculture practice (Gholipour, 2019).

j. While it is possible to get enough protein without increasing greenhouse gas emissions, policies that promote low-carbon food choices can also help. Patterns of food consumption can help achieve climate mitigation goals and improve health and well-being. A variety of measures can be used to achieve these goals, such as education and public communication campaigns. Food stamps and increased subsidies can also improve access to healthy food for low-income individuals (Soonsawad et al., 2022).

The Financial Investment for Low-Carbon Emission and Resilience for Energy Conservation

The stimulus package can help accelerate the transition to a climate-resilient electricity supply system while creating jobs (Singh & Das, 2018). While widespread solar and wind energy deployment is necessary, other forms of energy efficiency are also needed (Ohene-Asare et al., 2020). The energy stimulus measures proposed to boost energy consumption will have to consider all these changes while establishing a robust global energy system. The low oil and gas prices have caused energy efficiency and renewable incentives to decline (Ratner, 2020). This decline in financial influx for the energy sector is expected to accelerate and force less money invested in the renewable energy domain. The stimulus measures needed to boost energy efficiency and renewable energy are critical to a sustainable recovery. Aside from reducing greenhouse gas emissions, these stimulus packages can also help boost the decarbonization of the energy system (Simons, 2019). Aside from reducing greenhouse gas emissions, these programs can also benefit communities by increasing electricity access and reducing dependence on fossil fuels.

Energy efficiency is a vital component of a green recovery package, as it often requires the involvement of millions of people. In the U.S. and Europe, it is employed by over 3.3 million individuals. Having the right resources and structures in place can help improve the power system's resilience and deliver various well-being benefits. Beyond power, energy efficiency is also a key target for the building sector. Aside from reducing greenhouse gas emissions, energy efficiency can also help lower the cost of energy and boost the economy (Ratner, 2020). While it may seem like a win–win situation for the environment, the potential impact of electric vehicle electrification on greenhouse gas emissions is still unknown.

Challenges to scaling up distributed energy resources and energy conservation during the recovery are often small-scale projects with potential liquidity constraints. Governments could leverage their existing resources and create a pipeline of shovel-ready projects that can be scaled up in the short term through existing programs. Aside from infrastructure projects, stimulus packages can also include training to improve people's skills in the power and energy sectors (Xie & Zhou, 2021). This can consist of the deployment of smart grids and electric storage technologies. These could help improve the coordination of the various components of the energy supply chain. New technologies such as carbon capture and storage are also needed to reduce greenhouse gas emissions.

Energy Efficiency and Resiliency for Sustainable Cities

The COVID-19 crisis highlighted various shortcomings in the housing sector and the social inequality it has caused. Situations where housing quality makes it more

challenging to live comfortably, have become more visible. Buildings are responsible for 30% of global greenhouse gas emissions. Facilities are responsible for more than 30% of global greenhouse gas emissions. They use energy inefficiently and are often built to last (Ruiz Estrada, 2021). There is a strong need for both new and existing buildings to be energy efficient to meet the Paris Agreement's goals. Despite the benefits of building efficiency, many barriers remain. According to the International Finance Corporation, the cost of green buildings is equivalent to USD 1 trillion annually. While different country contexts may require different types of investments, policies and financing models are often key factors that hold back accelerated investment (Shamsuddin, 2020). The stimulus packages could help accelerate the deployment of massive retrofits to reduce greenhouse gas emissions from buildings. Various measures include tax breaks for energy efficiency and the scrapping of inefficient household appliances. The experience gained from the 2008 financial crisis has shown that these types of policies can stimulate private sector investment.

The COVID-19 pandemic could also contribute to the rise of demand for more minor dense communities as people avoid living in more densely populated areas. The surge in demand for less dense housing could also affect efforts to reduce greenhouse gas emissions (Jain et al., 2018). For instance, people may live in areas with higher infection risk. Urbanization strategies that target areas that people want to live in can help mitigate this trend and lower inequality (Mondal et al., 2017). Urban renewal can help cities improve their resiliency to climate change impacts. Urban renewal efforts should promote mixed-use development and enhance walking and cycling accommodations.

Catalyzing the Smart Accessibility-Based Mobility

For the passenger transport sector, stimulus packages should promote the transition to a low-carbon economy and investments in mobility. As governments consider long-term support for the car industry, they should ensure that their approval is contingent on the environmental improvements needed to make vehicles more energy efficient (Bichara et al., 2021). While supporting the recovery of the car industry, governments should also encourage the development of mobility systems that are designed to accommodate people with limited mobility. One system that should be scrapped is the lock-in of private vehicle ownership. This system would prevent people from using low-occupancy vehicles and limit the transport sector's emissions reduction potential.

Despite the number of people who work in the car industry, investing in public transport is still essential for mobility and jobs. However, governments need to address new challenges, such as people who are reluctant to use mass transit. As for the long term, governments can help improve public transport capacity and reduce crowding by investing in infrastructure. Some cities, such as Los Angeles and Reno, have already benefited from the drop in traffic during public transport projects. Governments could also encourage more collaboration between businesses

and public transport providers to make the most available transport capacity. While electric vehicle charging is a crucial component for the development of public transportation, it also comes with various costs.

As the economy begins to recover, it's time to move beyond traditional modes of transport and develop new ones that will create jobs and improve air quality. Around 150 cities have already started implementing emergency measures to create spaces for more active transportation. These measures could help make the changes permanent and promote more sustainable modes of transportation. Operational transportation modes, such as bikes and electric scooters, are essential to prevent a significant shift from public transport to cars. R&D support should develop new technologies that make these transportation options more sustainable. Road configurations should also accommodate the increasing number of freight movements in urban areas (Calvo-Poyo et al., 2019). Doing so could help minimize air pollution and make the transition to cleaner fleets easier (Das & Mondal, 2016). Supporting public and active transport modes will also help improve the efficiency of implementing policies that support the phasing out of fossil-fuel subsidies.

The Role of Digital Enterprises in Addressing the Challenges of Smart Supply Chains Will Help Accelerate the Circular Economy

The COVID-19 crisis highlighted the increasing complexity and global reach of value chains. As firms seek to improve resilience, they should avoid making changes that could inadvertently increase their environmental impacts. Recovery policies can help firms improve resource efficiency (Geng, 2021). A vital part of global economic activity is the production and shipping of raw materials and finished goods, a significant source of greenhouse gas emissions. Due to current trends, materials management is expected to account for over 50% of global greenhouse gas emissions by 2060. Despite widespread efforts to promote recycling, the rate of recycled materials worldwide has remained low.

The complexity of supply chains can create risks of disruption due to their dependence on leanness and efficiency. The concentration of upstream actors can also contribute to the risk of disruption. Reducing greenhouse gas emissions was also beneficial for developed nations as it shifted some of these emissions to other countries (Laubinger et al., 2020).

The complexity of supply chains also makes it hard to evaluate the risk of potential disruption. If firms are planning on improving resilience by reducing their supply chains, they should avoid increasing their environmental impacts. For instance, in the OECD area, offshoring has led to reducing greenhouse gas emissions.

The recovery measures announced by governments can help improve the efficiency of supply chains and reduce greenhouse gas emissions. In circular value chains, waste is diverted from landfills and used for remanufacturing recycling, and

reuse. It can result in numerous benefits. The availability of remanufacturing and recycling materials can also lead to expanding supply chains. The circular value chains can also help minimize greenhouse gas emissions ("Response to the Call: Has This Close Call Been a Wake-Up Call?", 2021). They can also provide opportunities to shift consumption away from primary materials. Governments can stimulate the uptake of the circular value chain through green procurement. It can involve removing trade barriers, establishing a tender procedure, and removing landfill fees.

An increase in digital technology for supply chain management can help minimize risks and improve resilience. It can also help companies identify and evaluate opportunities for reducing greenhouse gas emissions. The recovery from COVID-19 provides governments with an opportunity to align their policies with environmental objectives and disclose climate-related risks. Large firms can best utilize this approach to avoid hampering their activities through administrative burden. On the other hand, the digitalization of industrial processes can help improve production efficiency. Governments can help accelerate the uptake of digital technology by providing incentives and regulations. However, as automation becomes more prevalent, it could require more active labor market management to maximize the benefits.

Conclusion

Regardless of how the crisis or its aftermath plays out, the rise of digital technology will continue to transform how we live and work. The increase of 5G and the Internet of Things will create new opportunities to produce big data while also pushing the envelope in terms of security and privacy. As firms consider the benefits of increasing automation, they will also need to consider the impact on their operations and the resiliency of their data flows. Following the COVID-19 crisis, governments will have to re-evaluate their digital policies. They will also have to coordinate with their international partners.

References

4th G20 Finance Ministers and Central Bank Governors Meeting. (2021, October 13). MEF. Retrieved January 22, 2022, from https://www.mef.gov.it/en/inevidenza/4th-G20-Finance-Ministers-and-Central-Bank-Governors-Meeting-00001/

Agba, A. M. O., Ocheni, S. I., & Agba, M. S. (2020). COVID-19 and the world of work dynamics: A critical review. *Journal of Educational and Social Research, 10*(5), 119. https://doi.org/10.36941/jesr-2020-0093

Avelé, D. (2021). The financial crises of 1929 and 2008: What lessons learned from the COVID-19 health crisis? *Journal of Contemporary Research in Business Administration and Economic Sciences*. https://doi.org/10.52856/jcr311280113

Behera, M., Dash, M., Ayasa Kanta Mohanty, A. K., & Das, S. (2019). Entrepreneurial ecosystem: A geographical upliftment. *Revista Espacios, 40*, 26–36. http://www.revistaespacios.com/a19v40n01/19400126.html

Bichara, D. B., Dagher, Z. R., & Fang, H. (2021). What do COVID-19 tweets reveal about public engagement with nature of science? *Science & Education.* https://doi.org/10.1007/s11191-021-00233-y

Brown, R. (2021). How to save jobs and build back better: Employee ownership transitions as a key to an equitable economic recovery. *Maine Policy Review, 30*(2). https://doi.org/10.53558/hoze8462

Buchholz, W., & Rübbelke, D. (2020). Overstraining international climate finance: When conflicts of objectives threaten its success. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3726032

Calvo-Poyo, F., Medialdea, A., & Ferri-García, R. (2019). Citizens' opinion about investment in public transport projects in cities. *International Journal of Sustainable Transportation, 14*(10), 806–818. https://doi.org/10.1080/15568318.2019.1630529

Chen, Z., Marin, G., Popp, D., & Vona, F. (2020). Green stimulus in a post-pandemic recovery: The role of skills for a resilient recovery. *Environmental and Resource Economics, 76*(4), 901–911. https://doi.org/10.1007/s10640-020-00464-7

Das, S. (2020a). *Media impact of advertising on consumer buying behaviour a comparative study of different media.* Shiksha o Anusandhan University. http://hdl.handle.net/10603/273691

Das, S. (2020b). Innovations in digital banking service brand equity and millennial consumerism. *Digital Transformation and Innovative Services for Business and Learning* (pp. 62–79). IGI Global. https://doi.org/10.4018/978-1-7998-5175-2.ch004

Das, S. (2021a). *Digital Entertainment: The Next Evolution in Service Sector*. Springer Nature. https://doi.org/10.1007/978-981-15-9724-4. Print ISBN978-981-15-9723-7. Online ISBN978-981-15-9724-4.

Das, S. (2021b). *Search engine optimization and marketing: A recipe for success in digital marketing* (1st ed.). CRC Press. https://doi.org/10.1201/9780429298509

Das, S. (2021c). A systematic study of integrated marketing communication and content management system for millennial consumers. In *Innovations in digital branding and content marketing* (pp. 91–112). IGI Global. https://doi.org/10.4018/978-1-7998-4420-4.ch005

Das, S., & Mondal, S. (2016). *Yours digitally: Patanjali.* Available at SSRN 2737299.

Draper, C. E., Milton, K., & Schipperijn, J. (2021). COVID-19 and physical activity: How can we build back better? *Journal of Physical Activity and Health, 18*(2), 149–150. https://doi.org/10.1123/jpah.2021-0037

Duman, Ü. O., & Das, S. (2021). The dynamic rise of digital brands' market mavens in digital entertainment: A complete know how for curious customers. *Digital Entertainment* (pp. 147–172). Palgrave Macmillan. https://doi.org/10.1007/978-981-15-9724-4_8

Duy, N. T., Mondal, S. R., Van, N. T. T., Dzung, P. T., Minh, D. X. H., & Das, S. (2020). A Study on the Role of Web 4.0 and 5.0 in the Sustainable Tourism Ecosystem of Ho Chi Minh City, Vietnam. *Sustainability, 12*(17), 7140. https://doi.org/10.3390/su12177140

Environmental Health and Strengthening Resilience to Pandemics. (2020, April 21). OECD. Retrieved January 22, 2022, from https://www.oecd.org/coronavirus/policy-responses/environmental-health-and-strengthening-resilience-to-pandemics-73784e04/

Farooque, O. A. (2021). Agency-linked risk management with ownership and board sub-committee governance: Evidence from an OECD economy. *Journal of Risk and Financial Management, 14*(10), 472. https://doi.org/10.3390/jrfm14100472

Fraccascia, L., Giannoccaro, I., Agarwal, A., & Hansen, E. G. (2019). Business models for the circular economy: Opportunities and challenges. *Business Strategy and the Environment, 28*(2), 430–432. https://doi.org/10.1002/bse.2285

García, V. R., Gaspart, F., Kastner, T., & Meyfroidt, P. (2020). Agricultural intensification and land use change: Assessing country-level induced intensification, land sparing and rebound effect. *Environmental Research Letters, 15*(8), 085007. https://doi.org/10.1088/1748-9326/ab8b14

Geng, C. (2021). CURRENT STATE, TRENDS AND CHALLENGES OF CHINA'S DIGITAL TRADE. *International Trade and Trade Policy, 7*(2), 62–79. https://doi.org/10.21686/2410-7395-2021-2-62-79

Gholipour, H. F. (2019). The effects of economic policy and political uncertainties on economic activities. *Research in International Business and Finance, 48*, 210–218. https://doi.org/10.1016/j.ribaf.2019.01.004

Gruère, G., & Brooks, J. (2021). Viewpoint: Characterising early agricultural and food policy responses to the outbreak of COVID-19. *Food Policy, 100*, 102017. https://doi.org/10.1016/j.foodpol.2020.102017

Gupta, D. K., Jena, D., Samantaray, A. K., & Das, S. (2019). HRD climate in selected public sector banks in India. *Revista ESPACIOS, 40*(11).

Jain, S., Jain V., & Das, S. (2018). Relationship analysis between emotional intelligence and service quality with special evidences from Indian banking sector. *Revista ESPACIOS, 39*(33).

Laubinger, F., Lanzi, E., & Chateau, J. (2020). Labour market consequences of a transition to a circular economy: A review paper. *International Review of Environmental and Resource Economics, 14*(4), 381–416. https://doi.org/10.1561/101.00000120

Le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J. P., Abernethy, S., Andrew, R. M., De-Gol, A. J., Willis, D. R., Shan, Y., Canadell, J. G., Friedlingstein, P., Creutzig, F., & Peters, G. P. (2020). Temporary reduction in daily global CO_2 emissions during the COVID-19 forced confinement. *Nature Climate Change, 10*(7), 647–653. https://doi.org/10.1038/s41558-020-0797-x

López-Lozano, R., & Baruth, B. (2019). An evaluation framework to build a cost-efficient crop monitoring system. Experiences from the extension of the European crop monitoring system. *Agricultural Systems, 168*, 231–246. https://doi.org/10.1016/j.agsy.2018.04.002

Mohanty, P. C., Dash, M., Dash, M., & Das, S. (2019). A study on factors influencing training effectiveness. *Revista Espacios, 40*, 7–15. http://www.revistaespacios.com/a19v40n02/19400207.html

Mondal, S. (2021). A systematic study of new age consumer engagement and exploration for digital entertainment for over-the-top platforms in various digital media. In *Innovations in digital branding and content marketing* (pp. 113–133). IGI Global. https://doi.org/10.4018/978-1-7998-4420-4.ch006

Mondal, S. R. (2020a). *Factors influencing store image loyalty and satisfaction from customer perspective an empirical study in retail sector*. Shiksha o Anusandhan University. http://hdl.handle.net/10603/273688

Mondal, S. R. (2020b). A systematic study for digital innovation in management education: An integrated approach towards problem-based learning in vietnam. In *Digital innovations for customer engagement, management, and organizational improvement* (pp. 104–120). IGI Global. https://doi.org/10.4018/978-1-7998-5171-4.ch006

Mondal, S. R., & Das, S. (2021). Examining diabetic subjects on their correlation with TTH and CAD: A statistical approach on exploratory results. In *Machine learning and the internet of medical things in healthcare* (pp. 153–177). Academic Press. https://doi.org/10.1016/B978-0-12-821229-5.00007-0

Mondal, S. R., Virgilio, F. D., & Das, S. (2022). *H.R. analytics and digital H.R. practices*. Springer. https://doi.org/10.1007/978-981-16-7099-2

Mondal, S., Das, S., Musunuru, K., & Dash, M. (2017). Study on the factors affecting customer purchase activity in retail stores by confirmatory factor analysis. *Revista ESPACIOS, 38*(61).

Nadanyiova, M., & Das, S. (2020). Millennials as a target segment of socially responsible communication within the business strategy. *Littera Scripta, 13*(1), 119–134. https://doi.org/10.36708/Littera_Scripta2020/1/8

OECD. (2020a). *OECD-digital economy*. OECD iLibrary. Retrieved January 24, 2022, from https://www.oecd-ilibrary.org/sites/b7410bab-en/index.html?itemId=/content/component/b7410bab-en

OECD. (2020b). *Keeping the Internet up and running in times of crisis*. OECD. Retrieved January 20, 2022, from https://www.oecd.org/coronavirus/policy-responses/keeping-the-internet-up-and-running-in-times-of-crisis-4017c4c9/

OECD. (2020c). *OECD iLibrary*. Retrieved January 22, 2022, from https://www.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2020_bb167041-en

OECD. (2020d). *ICT access and usage by households and individuals*. Â© OECD. Retrieved January 24, 2022, from https://stats.oecd.org/Index.aspx?DataSetCode=ICT_HH2

Ohene-Asare, K., Tetteh, E. N., & Asuah, E. L. (2020). Total factor energy efficiency and economic development in Africa. *Energy Efficiency, 13*(6), 1177–1194. https://doi.org/10.1007/s12053-020-09877-1

Palmer, A., Atoloye, A., Bassarab, K., Calancie, L., Santo, R., & Cooksey Stowers, K. (2020). COVID-19 responses: Food policy councils are "stepping in, stepping up, and stepping back". *Journal of Agriculture, Food Systems, and Community Development*, 1–4. https://doi.org/10.5304/jafscd.2020.101.013

Ratner, S. R. (2020). International investment law and domestic investment rules: Tracing the upstream and downstream flows. *The Journal of World Investment & Trade, 21*(1), 7–33. https://doi.org/10.1163/22119000-12340166

Ravi, S., & Mondal, S. R. (2021). Digital entertainment based do it yourself content & advertisement as a factor of driving force for trust & customer patronage. In *Digital entertainment* (pp. 127–146). Palgrave Macmillan. https://doi.org/10.1007/978-981-15-9724-4_7

Response to the Call: Has This Close Call Been a Wake Up Call? (2021). *American Journal of Management, 21*(6). https://doi.org/10.33423/ajm.v21i6.4854

Ruiz Estrada, M. A. (2021). How much the COVID-19 vaccination campaign can help in the economic recovery? The case of Chile. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3873182

Shamsuddin, S. (2020). Resilience resistance: The challenges and implications of urban resilience implementation. *Cities, 103*, 102763. https://doi.org/10.1016/j.cities.2020.102763

Sharma, E., & Das, S. (2020). Measuring impact of Indian ports on environment and effectiveness of remedial measures towards environmental pollution. *International Journal of Environment and Waste Management, 25*(3), 356–380. https://doi.org/10.1504/IJEWM.2019.10021787

Sharma, E., & Das, S. (2021). Integrated model for women empowerment in rural India. *Journal of International Development*, 1–18. https://doi.org/10.1002/jid.3539

Sharma, E., Nigam, N., & Das, S. (2020). Measuring gap in expected and perceived quality of ICT enabled customer services: A systematic study of top ten retailers of India. *International Journal of Applied Systemic Studies, 9*(2), 159–184. https://doi.org/10.1504/ijass.2020.113260

Simons, P. (2019). IEA perspectives on the global energy landscape. *The APPEA Journal, 59*(3). https://doi.org/10.1071/aj18298

Singh, L. B., Mondal, S. R., & Das, S. (2020). Human resource practices & their observed significance for Indian SMEs. *Revista ESPACIOS, 41*(07). http://www.revistaespacios.com/a20v41n07/20410715.html

Singh, N. (2020). Developing business risk resilience through risk management infrastructure: The moderating role of Big Data analytics. *Information Systems Management, 39*(1), 34–52. https://doi.org/10.1080/10580530.2020.1833386

Singh, S., & Das, S. (2018). Impact of post-merger and acquisition activities on the financial performance of banks: A study of Indian private sector and public sector banks. *Revista Espacios Magazine, 39*(26), 25.

Siri, R., Mondal, S.R., & Das S. (2020) Hydropower: A renewable energy resource for sustainability in terms of climate change and environmental protection. In *The handbook of environmental chemistry*. Springer. https://doi.org/10.1007/698_2020_635

Siri, R., & Das, S. (2021). A study on processing of information storage & use of new age consumers in digital wellness sector through story telling & creating interest. In *Digital entertainment* (pp. 45–63). Palgrave Macmillan. https://doi.org/10.1007/978-981-15-9724-4_3

Smirnov, E. (2020). Global recession risks and challenges to economic regulation. *Mezhdunarodnaja Jekonomika (The World Economics), 3*, 37–46. https://doi.org/10.33920/vne-04-2003-04

Soonsawad, N., Martinez, R. M., & Schandl, H. (2022). Material demand, and environmental and climate implications of Australia's building stock: Current status and outlook to 2060. *Resources, Conservation and Recycling, 180*, 106143. https://doi.org/10.1016/j.resconrec.2021.106143

Stainback, K., Hearne, B. N., & Trieu, M. M. (2020). COVID-19 and the 24/7 news cycle: Does COVID-19 news exposure affect mental health? *Socius: Sociological Research for a Dynamic World, 6*, 237802312096933. https://doi.org/10.1177/2378023120969339

Tiwari, M., & Mondal, S. R. (2022). Technological dynamism of workforce management for effective education service delivery during and after Covid-19. In *H.R. analytics and digital H.R. practices* (pp. 199–215). Palgrave Macmillan. https://doi.org/10.1007/978-981-16-7099-2_8

U.N. (2020, August 21). *Philippines typhoon recovery, complicated by coronavirus concerns.* U.N. News. https://news.un.org/en/story/2020/05/1064202

Van, N. T. T., Vrana, V., Duy, N. T., Minh, D. X. H., Dzung, P. T., Mondal, S. R., & Das, S. (2020). The role of human-machine interactive devices for post-COVID-19 innovative sustainable tourism in Ho Chi Minh City, Vietnam. *Sustainability, 12*(22), 9523. https://doi.org/10.3390/su12229523

Xie, L., & Zhou, O. (2021). What improves subjective welfare during energy transition? Evidence from the clean heating program in china. *Energy and Buildings, 253*, 111500. https://doi.org/10.1016/j.enbuild.2021.111500

Xu, L., Zhang, Q., & Shi, X. (2019). Stakeholders strategies in poverty alleviation and clean energy access: A case study of China's P.V. poverty alleviation program. *Energy Policy, 135*, 111011. https://doi.org/10.1016/j.enpol.2019.111011

Yegen, C., & Mondal, S. R. (2021). Sharenting: A new paradigm of digital entertainment of new age parenting and social media. In *Digital entertainment* (pp. 213–231). Palgrave Macmillan. https://doi.org/10.1007/978-981-15-9724-4_11

HO Minh-Nhat, Ph.D., is working in the Department of Science and Technology, Ho Chi Minh City Government. His specialization areas are sustainable development goals, digital enterprise and their evolution, and various managerial innovation.

Jana Majerova, Ph.D., works as associate professor in department of economics and management at AMBIS University, (Prague, Czech Republic). Her professional and research activities are focused on the issue of the Sustainable brand management and bankruptcy law. She has authored more than 170 publications: 4 scientific monographs; 3 university textbooks; 1 script; 36 publications in journals registered in WoS or SCOPUS; and more than 80 papers published in conference proceedings.

Subhankar Das (Academician, Researcher, Author, Writer, Blogger, Data Science trainer, Social Media Marketing Consultant) received his Ph.D. in Social Media Advertisement & Media Planning. He has 12+ years of teaching and research experience. He is currently associated as Senior Research Fellow with Institute of Development Economics Research, University of Economics, Ho Chi Minh City, Vietnam. He has published 20+ Research Papers in various International Referred Journals (Scopus, Thomson Reuters, SSCI, SCIE).