Six Stories of Resilience:

Digital Technologies as Drivers of Development in the COVID-19 Era

The Asia Foundation

SIX STORIES OF RESILIENCE: DIGITAL TECHNOLOGIES AS DRIVERS OF DEVELOPMENT IN THE COVID-19 ERA

The Asia Foundation, 2021

The Asia Foundation is a nonprofit international development organization committed to improving lives across a dynamic and developing Asia. Informed by six decades of experience and deep local expertise, our work across the region addresses five overarching goals—strengthen governance, empower women, expand economic opportunity, increase environmental resilience, and promote international cooperation.

www.asiafoundation.org

Photos: Kate Trifo/Unsplash, cover photo; IMF/Flickr, page 7; ILO/F. Latief/Flickr, page 8; IMF/Saiyna Bashir/Flickr, page 9; The Asia Foundation, page 11; ILO/R. Pablo/Flickr, page 15; ILO/Flickr, page 16; Asian Development Bank/Eric Sales/Flickr, page 19

This paper was prepared by The Asia Foundation with support from Google.

CONTENTS

EXECUTIVE SUMMARY 4

1. GO DIGITAL TO GET BACK ON TRACK 6

2. A RESILIENT, DIGITAL APAC RESPONDS TO THE COVID-19 PANDEMIC 9
   - 2.1. Supporting Small Businesses 10
   - 2.2. Staying Safe While Learning Online 12
   - 2.3. Digital skills are opening up new opportunities 13
   - 2.4. Connecting Farmers to Global Value Chains 14
   - 2.5. Supporting COVID-19 Treatments and Shaping the Future of Healthcare 16
   - 2.6. Mobilizing Communities in Response to the Pandemic 18

3. LOOKING AHEAD: DIGITAL TECHNOLOGIES IN THE "NEW NORMAL" 20

4. LESSONS AND POLICY RECOMMENDATIONS 22
   - 4.1. A collaborative policy framework focused on an enabling digital environment 23
   - 4.2. Investing in digital infrastructure to expand internet access and affordability 24
   - 4.3. Promoting digital skills at all levels to close inequality gaps 25
   - 4.4. Raising awareness of online risks to take full advantage of connectivity 25
   - 4.5. Supporting adoption and innovation policies to take full advantage of digitalization 26

REFERENCES 27

EXECUTIVE SUMMARY

As local communities around the world have raced to adapt to the challenges posed by the COVID-19 pandemic, the importance of regional resilience in the Asia Pacific region (APAC) has never been so critical. From parents struggling to ensure their children have access to education resources to aging populations in need of essential health services to small business owners forced to contend with selling challenges they never imagined, COVID-19 has made some of the most common transactions exceedingly difficult to manage and more complex services - at times - almost impossible to deliver.

APAC's diverse communities are adapting to these many challenges across the region in part by leveraging the power of digital. Online platforms, mobile tools, AI-enabled digital services, and cloud applications, to name a few, have been key to supporting the region's resilience during this time of collective crisis - helping address new pandemic-related obstacles, shape and accelerate the region's recovery, and contribute to enhanced preparedness going forward. This process of digitalization has accelerated since the onset of the pandemic, and is transforming key sectors, such as micro, small and medium-sized businesses (MSMEs), education, healthcare, data collection and research, and the agri-food business.

In addition, hybrid solutions involving a mix of online and offline interactions - telemedicine and in-person care, being one example - may persist for some time going forward, with many critical services potentially hybridized permanently as communities discover the inherent efficiencies of hybrid models generating new value and leaps in productivity.

Across APAC, these changes are likely not transitory: businesses and education providers have heavily invested in digital adoption during the pandemic, workers and entrepreneurs are receiving training and upskilling education using online platforms, consumers are changing their preferences and leaning in on digital transactions, and patients are more regularly receiving healthcare using telemedicine at lower costs.

Looking beyond this challenging period, pandemic-related hybridization is likely to have profound implications for

international development. As APAC emerges from this period of crisis-driven digital transformation, the gains derived from accelerated adoption and hybridization - particularly in the areas of health care, education, and MSME development - could enhance longer-term efforts to achieve UN SDG outcomes once COVID-19 has been contained.

This white paper discusses how digital technologies are building COVID resilience, shaping and accelerating the recovery, and diffusing within APAC in ways that are likely to persist in a post-COVID world. **Section 1** presents the role of digital technologies in the Sustainable Development Goals (SDGs), examines the digital divide during COVID-19, and how APAC economies have been affected by the crisis.

Section 2 presents six cases of resilience, providing examples of how digital technologies can help solve immediate, pressing problems. Hiển, a business owner in Vietnam, demonstrates how MSMEs can go digital when entrepreneurs have the appropriate training. Miss Thanchanok Kamwinit, a teacher in Thailand, describes her work educating a new generation of digital citizens about online risks. Irfani recalls her journey to becoming a data scientist in Jakarta, where digital skills are in high demand. Sokneang, a co-founder and CEO of a fair trade startup in Cambodia, describes how digital platforms have been used in the agri-food sector during the pandemic. Gulshan, a Google Research Scientist, performs clinical trials in India to apply AI-based technologies in healthcare. Finally, Teh, a Malaysian citizen, volunteers in a vaccination center thanks to a digital platform that facilitates his civic engagement.

Section 3 describes how digital technologies can drive the near future - the "new normal," including the future of work as impacted by automation, and the need to transition to a low carbon economy.

Section 4 discusses lessons and guidelines for a policy response - emphasizing the importance of:

- a collaborative policy framework focused on an enabling digital environment
- investing in digital infrastructure to expand internet access and affordability
- promoting digital skills at all levels to close inequality gaps
- raising awareness of online risks to take full advantage of connectivity
- supporting adoption and innovation policies to take full advantage of digitalization

Online platforms and services give entrepreneurs, educators, healthcare professionals, workers, and policymakers new tools to address the pandemic's immediate impact, build in longer term resilience against future shocks, and accelerate economic growth. By working together to establish an enabling environment that facilitates innovation, and provides the necessary skills, infrastructure, and online security, the region can emerge from the COVID-19 pandemic stronger, healthier, and more prepared to take on future challenges.

1 GO DIGITAL TO GET BACK ON TRACK

The United Nations Sustainable Development Goals (SDGs) are part of the ambitious 2030 Agenda for Sustainable Development, a global collaborative action plan for eradicating poverty in all its forms, realizing human rights, empowering women and girls, and integrating sustainable development across economic, social and environmental[1] dimensions. Prior to the pandemic, and less than a decade away from the agenda's deadline, the world is not on track to meet these objectives. Meeting these goals now appears to be even more challenging in light of COVID-19.[2]

The effects of the COVID-19 in APAC

The COVID-19 pandemic has exacerbated inequalities and pre-existing gaps in a number of APAC countries. Global output contracted by 3.2 percent during 2020, while the economic output of Emerging and Developing Asia[3] decreased by one percentage point; China's GDP grew 2.7 percent, India decreased by 7.9 percent, and the five largest economies of ASEAN combined[4] decreased their GDP by 3.3 percent.[5]

In addition, there is a broad consensus that MSMEs have been more affected by the pandemic compared to other types of firms.[6] For example, by November 2020, the ADB reported that at least 30.5 percent of MSMEs observed a drop in their demand (with a maximum of 40.4 and 40 percent in Thailand and Lao PDR, respectively) and at least 41 percent temporarily closed (with a maximum of 70.6 percent in The Philippines).[7] MSMEs also observed significant cancellation of contracts (at least 14.1 percent by country) and production disruptions and the supply chain (at least 12.1 percent by country). By March 2021, the ADB provided further evidence surveying eight Asian countries:[8] during 2020, at least 22 percent of MSMEs reduced the number of permanent employees (with a maximum of 66 and 64 percent in Pakistan and Vietnam, respectively), and - by country - at least 30 percent of MSMEs reduced the number of temporary workers (with a maximum of 80 and 75 percent in Vietnam and Malaysia, respectively). MSMEs also experienced significant cash shortages (at least 33 percent by country) and temporary exits (at least 23 percent by country).[9]

Small farmers have also suffered as a result of the pandemic. The disruption in logistics is limiting their market reach and affecting their income. There are also reports of labor shortages, a significant decrease in the demand for agri-food products, and difficulties accessing storage and cooling facilities for the related surpluses.[10]

The pandemic is also creating long-term effects on children due to disruptions in their education. More than 20 million secondary-age girls could drop out of school globally - 1.2 million in East Asia and the Pacific region, and are exposed to a higher risk of sexual and gender-based violence (SGBV).[11] Preliminary studies have calculated that students in the region lost an estimated 29 percent of a learning-adjusted year of school.[12] Other research suggests that children will lose between 0.3 and 1.1 years of school in East Asia and the Pacific.[13] Since education disruption affects all levels of society, the closing of schools and rescheduling of the school year due to COVID-19 risks exacerbating critical education disparities in APAC.[14]

Digitalization Presents Opportunities but Challenges Remain

While the pandemic continues to threaten the region's development, digital technologies present a path to recovery, to achieving the SDGs, and with respect to the overall economic and social

well-being of the APAC region. Prior digital trends have accelerated, such as virtual and remote work driven by the need for socially distant collaboration. Reliance on e-commerce has also rapidly expanded due to the safer and more efficient transactions offered by digital platforms.[15] In other cases, where adoption rates may have been slower, the pandemic appears to have given new life to digitalization trends in education and health care.

While opportunities abound, a digitally-led recovery is not a given. Before the pandemic, the digital divide was a growing concern and remains so. By 2019, only half of the global population and nearly 20 percent of people in the least developed countries had access to the Internet. Moreover, the digital divide has a significant gender component that policymakers need to take into account: globally, there are 300 million fewer women than men able to access the Internet, smartphone ownership is 20 percent lower for women than men, and 207 million out of the 393 million women in the world without smartphones lives in South Asia. Thus, addressing the digital divide has become even more important with the ongoing COVID-driven digital transformation due to the risk of deepening these inequalities.[16]

2 A RESILIENT, DIGITAL APAC RESPONDS TO THE COVID-19 PANDEMIC

Although the consequences of the COVID-19 crisis are devastating, the context creates an opportunity to take advantage of the increasing adoption of digital technologies. MSMEs, farmers and students are already adopting a wide set of digital tools. Emerging countries are hosting frontier research on the application of algorithms in health sciences. Individuals all over Asia are contributing to the vaccination campaign, helped by digital platforms.

These advances in digital adoption and the innovations made during the COVID-19 crisis are likely to stick. The "new normal" is expected to trend toward digitally-enabled hybrid work across many sectors, supported by transformative technologies. While there is much work to be done, digital technologies now being implemented in an array of essential activities are helping the region get back on track and address key development challenges.

2.1. Supporting Small Businesses

During the pandemic, millions of business owners have needed to comply with social distancing measures to contain the spread of the pandemic, leading to a substantial reduction in income. Digital technologies gave them a much-needed lifeline while enabling them to adhere to pandemic mitigation policies. In fact, many MSMEs have now turned to e-commerce to engage with new and existing customers.[17]

Preliminary evidence shows that online retail sales grew 22 percent during 2020,[18] while overall retail sales declined by one percent worldwide.[19] Asia represents more than 60 percent of the world's online retail sales during 2020 (34.9 percent China and 24 percent the rest of Asia), and e-commerce was 23.8 percent of the total retail sales within the region, 4.8 percentage points higher than 2019.[20]

The increased use of digital technologies for commerce must be accompanied by equipping individuals and businesses with the relevant skills to take full advantage of these new opportunities.

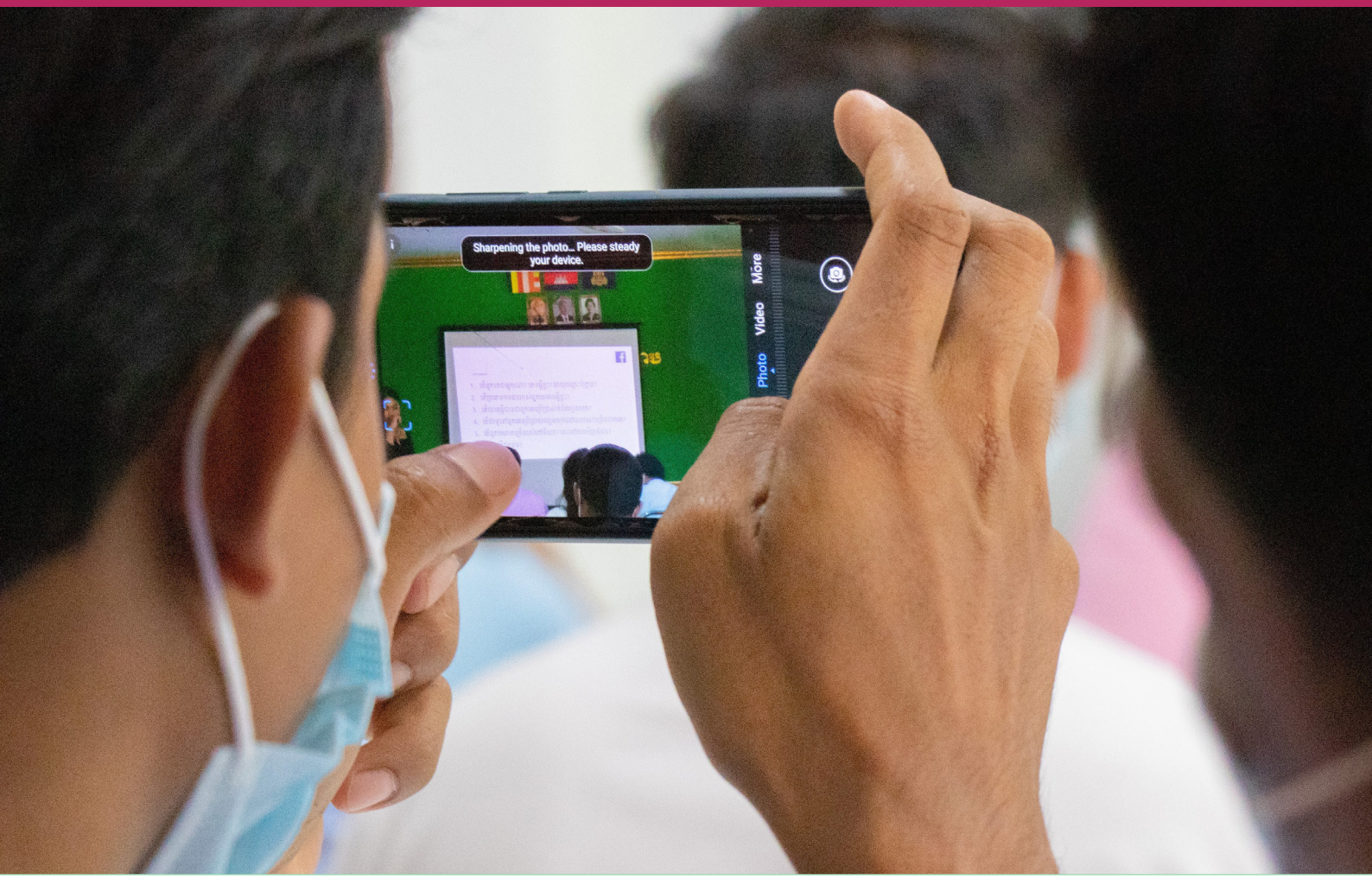
Countries and private organizations are taking steps to address existing digital skills gaps. For example, Go Digital ASEAN - an initiative of The Asia Foundation that is supported by a $3.3M Google.org grant - provides digital skills training to disadvantaged communities across ASEAN. This initiative is designed to equip MSMEs and the emerging workforce, particularly those in rural and isolated areas, with digital skills and tools; expand economic opportunity across ASEAN countries; and minimize the negative impact of the COVID-19 crisis. The initiative provides a curriculum for one-on-one training that focuses on digital literacy, digital tools, online safety, and follow-up mentoring. As of July 2021, The Asia Foundation has trained more than 144,000 beneficiaries. Women represent more than 77 percent of the total beneficiaries of the initiative, and 78 percent of the beneficiaries are under 35 years old.

With these tools, MSMEs can engage with their customer base and expand to new markets. For example, to cope with the decline in demand or physical lockdowns in local markets, MSMEs have adopted digital technologies to develop stronger ties with their communities and customer base during the COVID-19 pandemic. Some participants in the program are setting up social media accounts, creating and personalizing communication channels with customers and suppliers, improving transparency and accountability with employees, and networking virtually within entrepreneurial ecosystems.[21]

Nguyễn Thị Hiển is a business owner in Vinh Phuc Province, Vietnam

Go Digital ASEAN
The Asia Foundation
with support from Google.org

Hiển provides repair and maintenance, sells parts, and offers replacements and decorations for cars and motorbikes. Due to COVID-19, "the demand for repair and maintenance has decreased," she said. Go Digital ASEAN - a training program for entrepreneurs that focuses on developing new digital marketing and operations skills - helped Hiển expand her business to online sales. "I have been equipped with more knowledge about digital technology and applied it in business. I know how to use online information for improving my own business, how to join groups to sell and advertise my products, how to develop a marketing plan, and how to make online sales and make mobile payments for customers." She says the program "supported us to gain new customers in surrounding provinces as Thai Nguyen, Tuyen Quang and Bac Giang." During 2021 her sales and number of customers have increased by 20 percent compared to the previous period.



2.2. Staying Safe While Learning Online

The learning experience for the more than 1.5 billion students in the world affected by school and university closures has been varied.[22] Digital connectivity and the provision of basic digital infrastructure remain among the most critical issues for ensuring inclusive and equitable quality education during the pandemic. In addition to the immediate need for remote learning, one of the spillover challenges is to ensure that students accessing online tools and digital learning platforms have the appropriate skills to access the internet safely and securely. Addressing potential digital risks, such as sexting, cyberbullying, and other harmful activities is a critical issue when conducting online learning.[23]

In 2020, 60 percent of children between 8 and 12 years old were exposed to some type of cyber-risk,[24] while lockdowns and remote learning have increased cyberbullying susceptibility.[25] To face this public health issue, diverse governmental, multilateral and private programs are encouraging education on digital citizenship: providing tools to parents, educators, and students for basic norms of online behavior and wellbeing online.[26]

One initiative that is addressing these issues is Google's Be Internet Awesome,[27] which provides tools to educators to teach the fundamentals of digital citizenship and safety. This program provides a curriculum where teachers can discuss in the classroom the risk of false information online, how to recognize common internet scams, personal privacy issues, and basic digital hygiene. In Thailand, Be Internet Awesome trained nearly 100 thousand teachers during the first five months of 2021, impacting more than 1.6 million students by mid-August 2021. It is expected that another one million students will benefit from this program once schools open.

Miss Thanchanok Kamwinit is a teacher in Chiang Mai, Thailand

Be Internet Awesome.

Being a secondary teacher is a challenging yet rewarding occupation. Miss Kamwinit certainly knows about that, and she puts all of her heart into providing the best learning experience to secondary students in Chiang Mai, Thailand. Concerned about the risks that kids may be exposed to online, she uses Internet Be Awesome to raise awareness of some of the online risks students can encounter, and spark curiosity to educate responsible digital citizens. Miss Kamwinit describes Be Internet Awesome as helping her "give students actionable solutions that they can use in real-life scenarios."

Irfani Sakinah is a Geophysicist Engineer and a data scientist - Jakarta, Indonesia

bangkit

Google gojek tokopedia traveloka

Irfani, a young professional from Makassar, Indonesia, was receiving training to become a data scientist when the pandemic started in early 2020. Although she earned a major in Geophysical Engineering, she wanted to acquire skill sets that would place her in a position to take on highly skilled digital jobs and be prepared for new trends in the job market. Irfani is now one of 300 graduates from the first edition of Bangkit - an online training curriculum developed in partnership with Indonesia's Ministry of Education and Culture. Bangkit's curriculum allowed Irfani to learn technical skills and receive certifications from Coursera and Tensorflow. She also accessed mentoring sessions to encourage confidence in her capabilities. As a result, she's now a professional data scientist. "I felt that I was still not ready to apply for a job in the data sector," notes Irfani, "I needed more practice and experience. That's when I found out about Bangkit, and without hesitation, I enrolled." After she graduated from the program, Irfani was hired in Jakarta, and the Bangkit training was a key factor in her success. "I feel very capable of doing a good job in my new role with the knowledge I acquired with Bangkit," she recalls, "in the future, I want to continue my education and learn how AI, especially ML, can be optimally applied to the geothermal field."

2.3. Digital skills are opening up new opportunities

Prior to COVID-19, several South-East Asian countries were developing strategies, roadmaps, and action plans to prepare for automation and the Fourth Industrial Revolution (4IR).[28] Thailand, for example, observed one of the highest rates of adopting automated systems.[29] There were, however, concerns even during the pre-pandemic days that these trends could displace low-skilled workers and office work-intensive in routine and repetitive tasks.[30]

Recent data shows that Asia countries will need more prepared workers for the 4IR, especially with the acceleration of digital adoption during the pandemic. For example, the demand for jobs requiring digital skills in Indonesia exceeds the supply of skilled workers.[31] Yet, catching up is still a challenge. Only 19 percent of the workforce require applying any type of digital skill (compared to 63 and 62 percent in Singapore and South Korea, for example).[32] By 2025, Indonesia will need to implement more than 900 million digital skills trainings to meet the growing demand.

There are ongoing initiatives to address this gap. For example, Bangkit, an online education program for undergraduate students supported by industry partners (Google, Tokopedia, Traveloka and DeepTech) and the Ministry of Education and Culture of the Republic of Indonesia, offers three curricula or interdisciplinary learning paths - machine learning, mobile development, and cloud computing. Young students can earn university credits, get certifications, and receive incubation funding. By the first half of 2021, the program was able to enroll up to 3,000 students.

2.4. Connecting Farmers to Global Value Chains

The disruption caused by the pandemic has created an unexpected boost for digitalization and financial inclusion in agriculture value chains, including small farmers. For example, information-sharing platforms have helped farmers by providing them with expert knowledge on how best to prevent crop disease and pests.[33] B2B and B2C matching platforms can reduce transaction costs and expand the demand for local products, while other online platforms can provide a range of knowledge and specialized services through webinars and training sessions.

During COVID-19, the need to maintain food supply chains while complying with social distancing measures became a driver for digitalization. Several platforms adapted their business models in ways that enhanced key services for small farmers - improvements that will likely expand the benefits of digitalization in the upcoming years.

Digital Green, a development organization that provides technical assistance and technology extension services to farmers in India, developed an experimental model to provide farmers with tools to complement their social media sales with chatbots, artificial intelligence, and a web-based storefront.[34] This organization is also experimenting with a web platform to receive payments and facilitate direct links between farmers and buyers.

Kokopon, a women-led startup in Cambodia, made a more significant change during the pandemic. Prior to the crisis, they specialized in niche low-cost products and did not focus on the agri-food sector. However, due to the shifts in the supply chain and customer's needs, Kokopon built relationships with more than 100 local farmers to expand their customer base and improve their income. The shift made by Kokopon allowed them to feature more than 500 local products on their selling platform which targeted local customers, and directly supported the local economy. Part of the core business of this startup is engaging in fair trade while expanding opportunities to local farmers - such as training farmers to use the mobile e-payment platform, Bakong, to perform online transactions at no cost.

Connectivity is a key prerequisite for countries to have resilient value chains, and digital capabilities and investment in storage logistics and cold chains can expand the base for e-commerce and exports.[35] In this context, the growing digital capabilities developed during the pandemic will help speed the recovery of the agri-food sector.

Sokneang Neng is the co-founder and CEO of Kokopon

When Sokneang - co-founder of Kokopon, a Cambodian fair-trade e-commerce platform - noticed that farmers were struggling to sell their products due to the pandemic, she proactively reached out to them to learn how her business could help. Due to COVID-19, "we had to change almost everything," she said. "First, we changed the types of partners we work with, shifting from lifestyle businesses to farmers. We also changed our target audience from young people who wanted to save money to an audience who cares about their health and wants to support the local economy. Our technology also changed. Our new platform fits customer's needs to promote local products more efficiently."

2.5. Supporting COVID-19 Treatments and Shaping the Future of Healthcare

The use of advanced digital technologies in medical research was an ongoing trend before the pandemic. Among them, Artificial Intelligence (AI) models in healthcare are arguably one of the most disruptive advances. AI can sometimes outperform human healthcare professionals, and its full capacity is yet to be realized.[36]

Some of the current and potential applications of AI in medicine are in basic biomedical research (automating data collection, helping in gene function annotation, or performing automated experiments), translational research (e.g., helping in drug discovery or prediction of chemical toxicity), and in clinical practice (e.g., on disease diagnosis, automated surgery, patient monitoring, or interpretation of patient genomes).[37] Despite all of these advancements, there is a general belief that Artificial Intelligence technologies will not replace human clinicians and other healthcare workers; instead, these tools will likely enhance their work.[38]

During the current pandemic, one of the great challenges of treating COVID-19 - essentially considered a hyper inflammatory disease - is the need to reduce inflammation in patients. Corticosteroids are sometimes used to address this inflammation but also appear to hamper general immune response while also pushing up blood sugar levels in both diabetic and non-diabetic Covid-19 patients

- this can have the effect of worsening existing diabetes and potentially triggering new cases.[39] Patients with diabetes are also more likely to suffer severe effects of COVID-19, for example, one study found that patients with diabetic retinopathy - a marker for diabetes that also leads to blindness - were five times more likely to need intubation when hospitalized with COVID-19 than other patients.[40]

In India, researchers were able to identify indicators of the early stages of diabetic retinopathy among patients using artificial intelligence - a technique they call Automated Retinal Disease Assessment (ARDA).[41] The research is being conducted by a team from Google Accelerated Science (GAS), who are using thousands of retina images to create a device that accurately detects DR.

The goal is to use ARDA as part of primary care, so ophthalmologists can allocate more time to treat patients with retinopathy instead of screening. Identifying DR can also help flag patients who are at extreme risk of intubation from COVID-19.[42] In its very early stages, the research team is testing the technology with doctors and nurses on-site in India, and accumulating further data to validate their findings.

During the COVID-19 pandemic, researchers are also exploring using Artificial Intelligence to detect early symptoms through voice recordings,[43] infection[44] and COVID-19-related pneumonia[45] using chest computed tomographies, or asymptomatic infection through cellphone-recorded coughs.[46]

Varun Gulshan is helping in clinical trials in India

Gulshan, a Google Research Scientist, is using his knowledge of Artificial Intelligence algorithms to help people in India, his home country. Along with a multidisciplinary team from Google Accelerated Science (GAS), he's making breakthrough advances in implementing AI models to detect diabetic retinopathy (DR). This disease can lead to total blindness, but an early diagnosis can help medical staff provide adequate medications, exercise, therapies, and diet to avoid this. The early diagnosis technology they are developing - an Automated Retinal Disease Assessment (ARDA) - could save millions from blindness. "I had started thinking a lot about working on more fundamental problems. I wanted to use image recognition for something that would benefit society," he stated.

2.6. Mobilizing Communities in Response to the Pandemic

Connected citizens are shaping how civil society will engage and enact change in a post-COVID-19 era. Digital platforms create paths for people who do not necessarily have a healthcare background but want to contribute to their local communities by raising awareness with evidence-based content and engaging in volunteer work.

Organized citizens are also using social media to counter vaccine misinformation and reduce hesitancy. Volunteering online, for example, can contribute by closing information gaps creating content in local languages. In Nepal, several multilateral organizations helped create the Volunteer for Action (V4Action), a network of more than 500 volunteers tracking and fact-checking false online rumors, creating videos to raise awareness, organizing webinars, and making viral videos to communicate key messages.[47] The content they promote are messages approved by the World Health Organization.

People can also easily help their local vaccination centers when appropriate online tools are provided. The World Trade Center Kuala Lumpur (WTCKL) Vaccination Center, Malaysia, received nearly 100 volunteers per day to facilitate almost one million doses by mid-August. This was possible due to a partnership between the Government and civil society that jointly created MyVac (Malaysia Vaccine Support Volunteers).

MyVac is a platform established in collaboration with the Ministry of Health (MOH), Ministry of Science, Technology & Innovation (MOSTI), Ministry of Youth & Sports (KBS), Ministry of Higher Education (KPT) and Malaysian Red Crescent Society (MRCS). This tool is a volunteer mobilization facilitator, where volunteers can register online and choose one of the 605 Vaccine Administration Centres (VACs) around Malaysia. Vaccination centers benefit from two types of volunteers: general volunteers that help with logistics, administration and assists medical personnel, and health volunteers who help by providing medical information to patients, monitoring patients in observation, and administering the vaccines. By mid-August 2021, MyVac has received 1.5 million visitors, registered more than 300 thousand users, and deployed more than 8,000 volunteers.

Volunteering can accelerate the response to the pandemic, and volunteers are key to an effective local response to the COVID-19 crisis. In the coming years, volunteering platforms like MyVac will enhance APAC efforts to achieve SDGs commitments.[48]

Teh Choon Hong volunteers at the World Trade Center Kuala Lumpur (WTCKL) Vaccination Center

MYVAC
MALAYSIA VACCINE SUPPORT VOLUNTEERS

The global vaccination campaign has mobilized thousands of volunteers worldwide, like Teh, to contribute to overcoming the pandemic; however, matching volunteers with organizations that need them remains a challenge. Inspired by the vaccination campaign Teh, like thousands of Malaysians, decided to use MyVac - a volunteer matchmaking - to register as a volunteer. MyVac provided Teh with a list of sites that needed assistance, and he was then able to help with screening, doing temperature checks, ushering patients between stations, and supporting registration and observation. He regularly uses the platform to book times to volunteer, and has volunteered over 100 days of his time during the pandemic. He says that "MyVac is a great platform to link people regardless of age and background to volunteer in something they believe in and are passionate about, to make this society a better place. I find that it's fascinating to see so many MyVac volunteers selflessly contribute their time and energy to this cause. As for myself, serving and solving vaccines' problems are my main source of motivation to be at the center every day. I'm very proud of my work, and to see the vaccines' gratitude is priceless."

3 LOOKING AHEAD: DIGITAL TECHNOLOGIES IN THE "NEW NORMAL"

Digital technologies are shaping the COVID-19 response, and a broad set of innovative actors are leveraging digital tools to reinforce preparedness and accelerate the recovery. These entrepreneurs, employees, farmers, teachers, students, researchers, and citizens - are improving their digital capabilities and skills, and their efforts today will shape how we all engage with future challenges going forward. Looking ahead, digitalization will continue to advance in critical areas with significant implications for regional development.

MSMEs have been widely using digital tools during the pandemic, and firms will need to continue accelerating their digitalization process to match competitors and meet demand requirements. While COVID-19 accelerated digitalization, it is expected that the share of online activity will continue to grow. For example, in Asia it is expected that by 2025 the number of consumers using mobile payments will reach more than 2 billion, twice as large as in 2020.[49]

MSMEs that adapted digital tools before the pandemic were better positioned to resist the downturn of sales and clients.[50] In the coming years, digitalization will help firms expand their customer base, supplier networks, and differentiate their products and services with global markets in mind. MSMEs will also see gains in productivity and efficiency through the use of cloud computing, big data, and marketing analytics.

Education. The challenge for digital inclusion will shape how the learning process is delivered and how countries address the skill gaps. On the one hand, tools for EdTech will use real-time and online interactive methods - allowing online learning, hybrid education, personalized learning, and machine-based learning.[51] This will increase the need for school-based training in good digital citizenship and cyber hygiene.

In addition, the increasing demand for workers with digital skills at all levels will continue. The need for rudimentary digitally skilled workers will require new delivery mechanisms for basic digital knowledge and skilling throughout APAC. For specialized professionals, training in artificial intelligence and machine learning models, as well as advanced coding skills will be needed. In this context, public-private partnerships can help develop the reskilling and upskilling

curriculum needed to help workers adjust to rapid changes in skills demand.

Healthcare. The pandemic accelerated breakthrough advancements in the application of AI-based technologies. COVID-19 also increased the usage of telemedicine and other remote health services, which have favorable perceptions from patients and reduce costs. Health providers are increasingly using "digital front doors" to lower costs, provide accessibility and efficiently allocate medical workers time.[52] Hybrid models are on the rise, and during the "new normal" will drive healthcare provision.

Arguably, the emergency approval of mRNA vaccines - a technology based on digital sequencing of DNA into strands of mRNA[53] - is one of the greatest innovations of the COVID-19 era, and its full potential is not yet deployed. Promising research into its application in the fight against influenza virus, Zika virus, rabies, cancer, and the manufacturing of personalized vaccines is coming into focus.[54]

Agri-food sector. Among digital extension services and matching platforms, new digital-based innovation in agriculture will drive the sector's adaptation to climate change. For example, the diffusion and new innovations in precision agriculture and irrigation can drastically reduce water consumption and mitigate the effects of climate change.[55]

Digitalization, disruption, and change – Fourth Industrial Revolution (4IR) and green technologies

Digital technologies in the 4IR. Automation, particularly in the manufacturing sector, may displace jobs that heavily feature routine tasks, and this has significant implications for Asian economies. There are one million shop sales assistants in Thailand, Indonesia employs about 1.7 million office clerks, and in Cambodia, half-million jobs in the garment industry are at risk.[56] Countries need to upskill their workers, and identify and take advantage of the complementarities of novel automated technologies.

Remote work. The need for businesses to maintain operations during lockdowns or adhere to social distancing measures has created a push for remote work that leverages digital platforms to facilitate collaboration and communication. Since telework usually is performed by high-skilled workers and is intensive in specific sectors such as services, workers with lower qualifications or manual tasks are more likely to suffer employment shocks as a result of the COVID-19 pandemic.[57] In addition, since women typically perform more unpaid work, such as childcare and household chores, remote work can exacerbate gender inequalities.[58]

In the long term, the COVID-19 pandemic and the increasing adoption of remote work have reshaped the labor market. For example, the likelihood that a significant proportion of future jobs will not require a full-time physical presence means that remote work will be part of the "new normal." Moreover, the increasing demand for hybrid jobs (partially remote) will push a trend for the de-densification of urban spaces. Also, the need to comply with social distancing measures may have reinforced the demand for automated technologies.[59]

Green technologies. While the pandemic crisis is still ongoing, new evidence shows that the climate challenge may be

4 LESSONS AND POLICY RECOMMENDATIONS

The COVID-19 pandemic is a devastating experience for humanity. Millions of people have lost their lives or close relatives, and millions more have suffered from the disease with no clear sense of the long-term consequences. The crisis has also likely reinforced pre-existing inequalities and amplified societal challenges.

However, as this white paper suggests, communities can build resilience and contribute to their economic recovery by leveraging digital tools and technologies. Entrepreneurs are using digital tools to build new capabilities that increase their customer base or address downturns in sales. Educators are providing remote learning experiences that connect with new and existing students - some in remote parts of the region. Healthcare workers are leveraging digital to address the pandemic more effectively, and medical researchers have new tools to evaluate cases. Farmers are leveraging platforms to respond to selling bottlenecks, as these very same underlying technologies make it possible to recruit volunteers for vaccination campaigns in the fight against the virus. All of this takes place as persistent development challenges linger in the background - such as the potential challenges posed by the 4IR, and the need to transition to a low-carbon economy.

Digitalization creates new opportunities to increase and distribute the benefits of the economic recovery by facilitating cost-efficient solutions for individuals, companies, and governments but taking full advantage of digital technologies within APEC is not a given or inevitable outcome. Policymakers, the private sector, and civil society need a shared vision and must take coordinated actions.

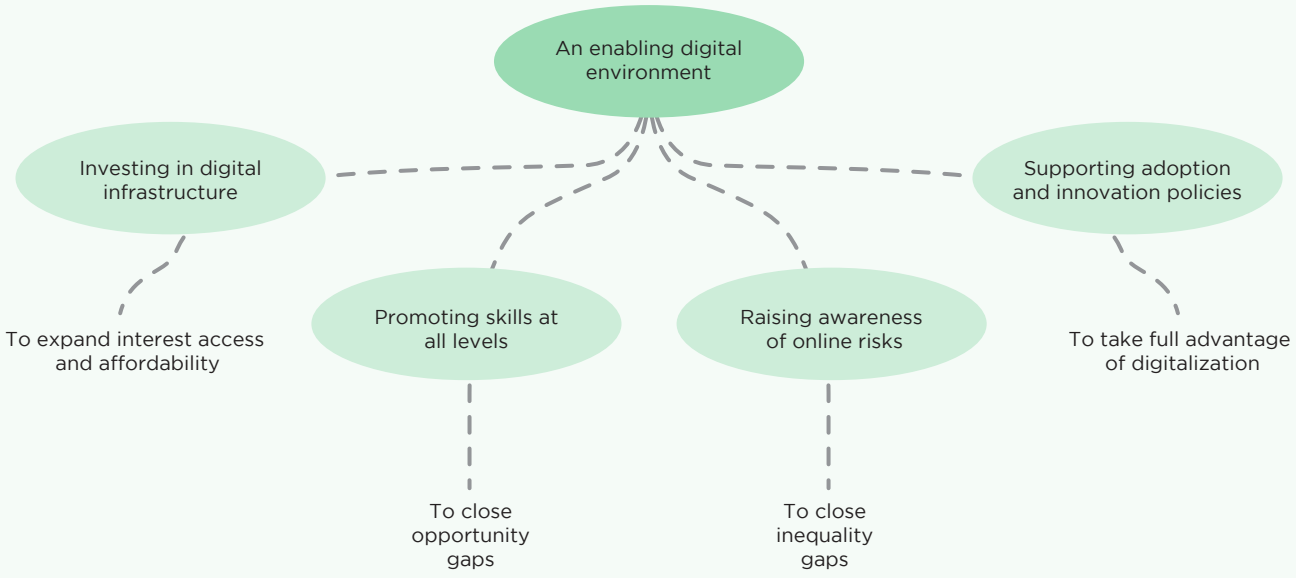
In a previous volume of this series, released in 2017, we addressed four recommendations: support efforts to increase internet access and affordability, promote digital literacy, create enabling environments for platforms and users, and support research and stakeholder engagement to identify the most promising areas for donor support. Since then, significant improvements have taken place: countries have been developing national strategies, the private sector has been supporting global and local-based initiatives to accelerate

digitalization, and several multilateral and civil society organizations are collaborating to upskilling and promoting digital innovations. Yet, despite all of these efforts, the consequences of the COVID-19 crisis show there is room for further deliberation and reforms. With this edition, we propose five digital economy policy interventions to promote a more resilient, inclusive APAC region by focusing on:

- a collaborative policy framework focused on an enabling digital environment
- investing in digital infrastructure to expand internet access and affordability
- promoting digital skills at all levels to close inequality gaps
- raising awareness of online risks to take full advantage of connectivity
- supporting adoption and innovation policies to take full advantage of digitalization

4.1. A collaborative policy framework focused on an enabling digital environment

To fully take advantage of digitalization, countries need a collaborative policy framework to foster global best practices. While several countries in APAC have designed strategies, roadmaps, or action plans to address issues related to the digital economy (e.g., digitalization in MSMEs, cybersecurity, 4IR), digitalization is a whole-of-government effort. For example, non-tariff trade barriers such as data localization or onerous licensing procedures may ultimately hinder digital innovation in local MSMEs. The lack of indirect support for firms during their early-stage (such as loans or credit guarantees) may ultimately affect the startup ecosystem, reducing competition and access to finance. Uneven cross-border digital tax regimes that fail to



harmonize and make transparent the cost of doing business from one regime to the next can hamper dynamism in the digital economy. Digital tax regimes should also consider recognizing some of the differences between large, established companies and those startups and small-footprint entrepreneurial enterprises - either local or international - which are largely digital but operating with different business models and profit margins. A comprehensive approach to promoting digital trade can foster resilience and digital trade agreements can provide useful frameworks to promote predictability and interoperability.

On the other hand, the increasing usage of digital technologies may reinforce pre-existing inequalities and cultural biases due to a lack of local language support, or a digital divide that limits access to relevant skilling initiatives. Furthermore, when the public sector implements digital government tools - a desirable outcome given the associated efficiencies - policymakers should consider these factors when formulating e-government policies. Finally, when there is a potential tradeoff between inclusivity and competitiveness, public support should promote mitigating measures to avoid increasing existing inequalities (e.g., the consequences of the 4IR).

4.2. Investing in digital infrastructure to expand internet access and affordability

Facilitating internet access is the cornerstone of any effort to address the digital divide. Promoting public and private investment in digital infrastructure allows MSMEs to access new markets, use social media and e-commerce tools to promote their products and services, and participate in extended value chains; students can access remote learning while schools use new tools to improve the learning process; small farms can create linkages and uses digital tools to use their resources efficiently; and policymakers can deliver public goods more efficiently.

Moreover, digital infrastructure will increasingly be a defining component of a country's competitiveness. The expansion of 5G networks will be a key input for investing in data-intensive and real-time novel technologies, such as the ones identified as part of the 4IR - Internet of Things, automation, robotization. Moreover, expanding affordable access to the Internet will contribute to the 'dematerialization' of products and services and open the path for innovations that mitigate, adapt or enact climate resilience.

Government has a clear role to play in creating the right environment for investment in this critical area. Focusing on adequate competition within the industry can drive investment in physical infrastructure. Establishing a regulator that is independent has been shown to help level the playing field and promote trust among investors. Greater openness to outside capital in the form of foreign direct investment can expand the resource pool for large scale infrastructure rollout and help to upgrade the existing technologies. Reforming the rules that govern the cost and accessibility of RF spectrum can make more space for commercial use, and as a result drive

expanded investment in the development of national infrastructure. Promoting universal service funds or developing public-private partnerships to connect underserved or remote areas can enhance connectivity among marginalized populations. Partnerships with non-profit organizations dedicated to connecting underserved populations can help tackle the 'last mile' in areas that have yet to be reached through the private sector or government investment can also play an important role.

Digital connectivity and the provision of basic digital infrastructure are also relevant due to their potential impact on remote education. By 2020, only 16 percent of school children in the world could access internet tools, 35 percent in East Asia and the Pacific, and 7% in South Asia.[62] This digital divide in remote learning is even more prominent considering the household's geographic location (urban/rural) and income level. Investing in digital infrastructure and an affordable Internet can address this issue directly.

4.3. Promoting digital skills at all levels to close inequality gaps

Developing countries need to close the digital skills gaps within different social groups and between other richer economies. Basic digital skills must be incorporated into school curriculums. In addition, governments should reinforce policy interventions to provide basic digital training to entrepreneurs, employees, and potential workers. These policies should particularly target marginalized groups and women.

In the case of the provision of more advanced digital capabilities, countries should design demand-driven interventions in partnership with the private sector, and provide training courses according to existing digital capabilities and in response to demand from MSMEs. Additionally, governments should encourage higher education institutions to strengthen their linkages with the private sector to train and employ highly qualified digital experts in areas such as Artificial Intelligence, machine learning, and cybersecurity.

4.4. Raising awareness of online risks to take full advantage of connectivity

While expanding the access to online tools for vast portions of the population, governments should pay attention to online risks, such as information disorder, cybercrime, and limited understanding - in certain communities - of what constitutes good digital citizenship. Policy interventions should enable an open dialogue with civil society, media, and the international community to counter information disorder and enhance understanding of the channels from which false information is spread. The public sector should reinforce its institutional capabilities to detect and minimize cyber threats, directly affecting businesses of all sizes and victimizing marginalized communities. In addition, governments should enhance relevant crisis communication capabilities in critical areas affected by misinformation, and facilitate partnerships between professionals, organizations, and other government partners with expertise countering online threat actors.

Recognizing and responding to online risks should also not exclusively be addressed via top-down approaches. Effective responses should include a focus on grassroots, community-level citizen engagement, as well as the development of a basic digital skills curriculum in schools and training that targets small businesses and local organizations. The benefits of all these measures could significantly exceed the costs.

4.5. Supporting adoption and innovation policies to take full advantage of digitalization

Developing countries should not only be adopters of digital technologies but also developers of local-based innovations, incorporating local needs, culture, and consumer preferences. In this context, the direct and indirect support provided to actors in an innovation system (e.g., firms of all sizes or higher education and research institutions) should be oriented to identify specific and measurable outcomes addressing SDGs. Digital-based innovations can only be transformative if the entire innovation system is set to expand the diffusion and adoption of inclusive innovations.

REFERENCES

[1] UN General Assembly (2015). "Transforming our world: the 2030 Agenda for Sustainable Development." Resolution adopted by the General Assembly on 25 September 2015

[2] UN Economic and Social Council (2021). "Progress towards the Sustainable Development Goals." Report of the Secretary-General April 2021

[3] Includes: Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India, Indonesia, Kiribati, Lao PDR, Malaysia Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Nepal, Palau, Papua New Guinea, The Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Vietnam.

[4] Indonesia, Malaysia, Philippines, Thailand, and Vietnam.

[5] IMF (2021). "World Economic Outlook Update: Fault lines widen in the Global Recovery." July 2021.

[6] OECD (2021). "OECD Policy Responses to Coronavirus (COVID-19). One year of SME and entrepreneurship policy responses to COVID-19: Lessons learned to 'build back better'." April 2021. https://www.oecd.org/coronavirus/policy-responses/one-year-of-sme-and-entrepreneurship-policy-responses-to-covid-19-lessons-learned-to-build-back-better-9a230220/; and UNIDO (2021). "COVID-19 pandemic: threats to SMEs in poorest nations require swift policy action." By Frank Hartwich and Jenny Larsen. June 2021. https://www.unido.org/stories/covid-19-pandemic-threats-smes-poorest-nations-require-swift-policy-action

[7] Survey conducted in Indonesia, Lao PDR, Thailand and The Philippines. ADB (2020). "Asia Small and Medium-sized Enterprise Monitor 2020." Volume II -COVID-19 Impact on Micro, Small and Medium-Sized Enterprises in Developing Asia. http://dx.doi.org/10.22617/TCS200311-2

[8] Bangladesh, India, Indonesia, Lao PDR, Malaysia, Mongolia, Pakistan, and Vietnam.

[9] Sonobe, T.; Takeda, A.; Yoshida, S.; and Hoa Thi Truong (2021). "The Impacts of the COVID-19 Pandemic on Micro, Small, and Medium Enterprises in Asia and Their Digitalization Responses." ADBI Working Paper Series, No. 1241, March 2021.

[10] FAO (2020). "FAO COVID-19 Response and Recovery Programme: Asia and the Pacific – Boosting smallholder resilience for recovery." Bangkok. https://doi.org/10.4060/cb1518en

[11] UNICEF: COVID-19 and Girls' Education in East Asia and Pacific

[12] ADB (2021). "Learning and earning losses from COVID-19 school closures in developing Asia." April 2021

[13] Azevedo, J.P.; Hasan, A.; Goldemberg, D.; Iqbal, S.A.; and Koen Geven (2020). "Simulating the Potential Impacts of COVID-19 School Closures on Schooling and Learning Outcomes: A Set of Global Estimates." World Bank, Policy Research Working Paper No. 9284 https://openknowledge.worldbank.org/handle/10986/33945

[14] United Nations (2020). "Education during COVID-19 and beyond." Policy Brief. August 2020. https://unsdg.un.org/sites/default/files/2020-08/sg_policy_brief_covid-19_and_education_august_2020.pdf

[15] Deloitte (2020). "Covid-19 Induced Business Trend: Preparing for the new normal." https://www2.deloitte.com/content/dam/Deloitte/de/Documents/covid-19-induced-business-trends-deloitte-whitepaper.pdf

[16] UN Secretary-General (2020). "Narrowing Digital Divide Could Become 'Greatest Equalizer' in Promoting Equality, Secretary-General Tells Online Conference, Calling on Nations to Support Youth." SG/SM/20225, September 1, 2020 https://www.un.org/press/en/2020/sgsm20225.doc.htm

[17] Karr, J., Loh, K. and Andre Wirjo (2020). "Supporting MSMEs' Digitalization Amid COVID-19." APEC Policy Support Unit 2020.

[18] Data available at May 2021, considering 65% of B2C global e-commerce by 2019 (Australia, Canada, China, Singapore, South Korea, United Kingdom and United States).

[19] UNCTAD (2021). "Estimates of global e-commerce 2019 and preliminary assessment of COVID-19 impact on online retail 2020." UNCTAD Technical Notes on ICT for Development, No 18.

[20] Digital Commerce 360 (2021). "Asia accounts for nearly 60% of the world's online retail sales." By Don Davis, Feb 17, 2021 https://www.digitalcommerce360.com/article/asia-ecommerce-top-retailers/

[21] Liguori, E. and Pittz, T. (2020). "Strategies for small business: Surviving and thriving in the era of COVID-19." Journal of the International Council for Small Business, Vol 1 (2), pp. 106-110. https://doi.org/10.1080/26437015.2020.1779538

[22] UNESCO (2020). "Global Education Coalition." COVID-19 Education Response.

[23] OECD (2019). "Educating 21st Century Children: Emotional Well-Being in the Digital Age." OECD Educational Research and Innovation. October 2019.

[24] Jackman, J.; Gentile, D.; Cho, N.-J.; and Yuhyun Park (2021). "Addressing the digital skills gap for future education." Nature Human Behaviour, Vol 5, pp. 542–545 https://doi.org/10.1038/s41562-021-01074-z

[25] Jain, O.; Gupta, M.; Satam, S.; and Siba Panda (2020). "Has the COVID-19 pandemic affected the susceptibility to cyberbullying in India?" Computers in Human Behavior Reports, Vol 2. https://doi.org/10.1016/j.chbr.2020.100029

[26] OECD (2019). "Educating 21st Century Children: Emotional Well-Being in the Digital Age." OECD Educational Research and Innovation. October 2019.
European Education Policy Network (2020). "Active citizenship skills and active digital citizenship skills in teaching and learning in the digital age." Authors: Filipa Soares and Amélia Lopes. EEPN EAC-2020-0278.

[27] Google (2021). "Be Internet Awesome." https://beinternetawesome.withgoogle.com/th_th/

[28] Sudan, R. (2019). "Southeast Asian Perspectives on Preparing for the Future of Work Randeep Sudan." In: Anthea Mukala (2019), "The Fourth Industrial Revolution and the Future of Work: The Fourth Industrial Revolution and the Future of Work: Implications for Asian Development Cooperation." KDI School of Public Policy and Management, Korea https://asiafoundation.org/wp-content/uploads/2021/02/Korea-The-Fourth-Industrial-Revolution-and-the-Future-of-Work_EN.pdf

[29] MIT Technology Review (2018). "These charts show how Asia is dominating industrial-robot adoption
Europe and America have far fewer robot workers than we might expect them to have." By Erin Winick. November 2018 https://www.technologyreview.com/2018/11/27/66355/these-charts-show-how-asia-is-dominating-industrial-robot-adoption/

[30] Karr, J., Loh, K. and Emmanuel San Andres (2020). "COVID-19, 4IR and the Future of Work" https://asiafoundation.org/wp-content/uploads/2020/07/COVID-19-4IR-and-the-Future-of-Work.pdf

[31] APEC (2020). "APEC Closing the Digital Skills Gap Report: Trends and Insights." SOM Steering Committee on Economic and Technical Cooperation (SCE), Human Resources Development (HRDWG). December 2020.

[32] AlphaBeta (2021). "Unlocking APAC's Digital Potential: Changing Digital Skill Needs and Policy Approaches." Commissioned by Amazon Web Services. February 2021.

[33] The Asia Foundation (2017). "Six Stories, Six Paths to Development: Online Platforms as Drivers of Inclusive Growth." https://asiafoundation.org/wp-content/uploads/2017/02/Six-Stories-Six-Paths-to-Development-Online-Platforms-as-Drivers-of-Inclusive-Growth.pdf

[34] DAI (2021). "Digital Solutions Used by Agriculture Market System Actors in Response to COVID-19. Results of a rapid Analysis." By Judy Payne and Marcella Willis. April 2021. https://www.dai.com/uploads/Rapid%20Analysis_External%20FRMT2.pdf

[35] FAO (2020). "The impact of COVID-19 on food and agriculture in Asia and the Pacific and FAO's response." FAO Regional Conference for Asia and the Pacific. September 2020. http://www.fao.org/3/nd476en/nd476en.pdf

[36] Arora, A. (2020). "Conceptualising Artificial Intelligence as a Digital Healthcare Innovation: An Introductory Review." Med Devices (Auckl). 2020; 13, pp. 223–230. https://dx.doi.org/10.2147%2FMDER.S262590

[37] Yu, K.-H.; Beam, A.; and Isaac Kohane (2018). "Artificial intelligence in healthcare." Nature Biomedical Engineering, Vol 2, pp. 719–731. https://doi.org/10.1038/s41551-018-0305-z

[38] Bohr, A., and Memarzadeh, K. (2020). "The rise of artificial intelligence in healthcare applications." In: Adam Bohr and Kaveh Memarzadeh (2020), "Artificial Intelligence in Healthcare" https://doi.org/10.1016/B978-0-12-818438-7.00002-2

[39] BBC (2021). "Covid-19: Fears over sharp rise in diabetes in India." https://www.bbc.com/news/world-asia-india-58066767; The Hindu (2021). "Doctors see many new cases of diabetes post COVID-19." https://www.thehindu.com/news/national/karnataka/doctors-see-many-new-cases-of-diabetes-post-covid-19/article36599360.ece

[40] US News (2020). "How COVID-19 and Diabetic Retinopathy Are Linked." https://health.usnews.com/health-care/patient-advice/articles/how-covid-19-and-diabetic-retinopathy-are-linked

[41] Google. "Seeing Potential: How a team at Google is using AI to help doctors prevent blindness in diabetics." https://about.google/intl/ALL_us/stories/seeingpotential/

[42] Corcillo A.; Cohen, S.; Li A; Crane C.; Kariyawasam, D.; and Janaka Karalliedde (2021). "Diabetic retinopathy is independently associated with increased risk of intubation: A single centre cohort study of patients with diabetes hospitalised with COVID-19." Diabetes Research and Clinical Practice. January 2021, 171:108529. https://doi.org/10.1016/j.diabres.2020.108529

[43] The Lancet Editorial (2021). "Do I sound sick?" The Lance t Digital Health, Vol 3. September 2021 https://www.thelancet.com/action/showPdf?pii=S2589-7500%2821%2900182-5

[44] Mei et al. (2020). "Artificial intelligence–enabled rapid diagnosis of patients with COVID-19" Nature Medicine, Vol 26, pp. 1224-1228. https://doi.org/10.1038/s41591-020-0931-3

[45] Harmon et al. (2020). "Artificial intelligence for the detection of COVID-19 pneumonia on chest CT using multinational datasets." Nature Communications, Vol 11, Article No.: 4080. https://doi.org/10.1038/s41467-020-17971-2

[46] Laguarta, J.; Hueto, F.; and Brian Subirana (2020). "COVID-19 Artificial Intelligence Diagnosis Using Only Cough Recordings." IEEE Journal of Engineering in Medicine and Biology, Vol 1, pp. 275-281. https://doi.org/10.1109/OJEMB.2020.3026928

[47] UN Volunteers (2021). "V4Action in Nepal: Volunteers curb misinformation about COVID-19" February 2021. https://www.unv.org/Success-stories/v4action-nepal-volunteers-curb-misinformation-about-covid-19

[48] UN Volunteers (2016). "Volunteering as Essential in Achieving Sustainable Development: UNV Responding to the 2030 Agenda." UNV Discussion Paper. Version: April 2016.

[49] McKinsey (2020). "The future of payments in Asia." Global Banking Practice. https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/The%20next%20frontier%20in%20Asia%20payments/The-future-of-payments-in-Asia-vF.pdf

[50] Connected Commerce Council and Google (2021). "Digitally Driven 2021 - U.S. Small Businesses Find a Digital Safety Net for Adaptation, Resilience, and Innovation During COVID-19." https://connectedcouncil.org/wp-content/uploads/2021/04/Digitally-Driven-2021.pdf

[51] ADB (2020). "COVID-19 and Education in Asia and the Pacific." Guidance Note, January 2021. https://www.adb.org/sites/default/files/institutional-document/672491/covid-19-education-asia-pacific-guidance-note.pdf

[52] McKinsey (2021). "Telehealth: A quarter-trillion-dollar post-COVID-19 reality?" By Oleg Bestsennyy, Greg Gilbert, Alex Harris, and Jennifer Rost. July 9, 2021 https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality

[53] Nature (2019). "Unlocking the potential of vaccines built on messenger RNA." Nature 574, S10-S12. https://doi.org/10.1038/d41586-019-03072-8

[54] Pardi, N.; Hogan, M.; Porter, F.; and Drew Weissman (2018) "mRNA vaccines — a new era in vaccinology." Nature Reviews Drug Discovery, Vol 17, pp. 261–279 https://www.nature.com/articles/nrd.2017.243, and NIH (2016). mRNA Cancer Vaccines https://pubmed.ncbi.nlm.nih.gov/28101688/

[55] Schroeder, K.; Lampietti, J.; and Ghada Elabed (2021). "What's Cooking: Digital Transformation of the Agrifood System." Agriculture and Food Series. Washington, DC: World Bank. doi:10.1596/978-1-4648-1657-4. License: Creative Commons Attribution CC BY 3.0 IGO

[56] The Asia Foundation (2020). "The Future of Work Across ASEAN. Policy Prerequisites for the Fourth Industrial Revolution -Recommendations and Country Studies." https://asiafoundation.org/wp-content/uploads/2020/02/The-Future-of-Work-Across-ASEAN_full.pdf

[57] ADB (2020). "COVID-19, Technology, and Polarizing Jobs." ADB Briefs No. 147. August 2020 http://dx.doi.org/10.22617/BRF200217-2

[58] ILO (2020). "Teleworking during the COVID-19 pandemic and beyond A Practical Guide." Geneva: International Labour Office, July 2020.

[59] www.brookings.edu/wp-content/uploads/2020/08/AutorReynolds_LO_FINAL.pdf

[60] IPCC (2021). "Climate Change 2021: The Physical Science Basis. Summary for Policymakers." IPCC AR6 WGI. August 2021 https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

[61] UNCTAD (2021). "Climate change, green recovery and trade." UNCTAD/DITC/TED/2021/2

[62] UNICEF (2020). "Are children able to continue learning during school closures? - A global analysis of the potential reach of remote learning policies." August 2020. https://data.unicef.org/resources/remote-learning-reachability-factsheet/

```
def __init__(self, *args, **kwargs):
    """
    Convert SlugField to TypedChoiceField
    """
    super(EnterpriseCustomerForm, self).__
    idp_choices = utils.get_idp_choices()
    if idp_choices is not None:
        self.fields['identity_provider'] =


class Meta:
    model = EnterpriseCustomer
    fields = "__all__"
ange_actions = ("manage_learners",)

taticmethod
f logo(instance):
  """
6 +61,30 @@ def logo(instance):
      return instance.branding_configuratio
  return None


f manage_learners(self, request, obj):  # p
  """
  Object tool handler method - redirects to
  """
  # url names coming from get_urls are pref
  manage_learners_url = reverse("admin:" +
  return HttpResponseRedirect(manage_learne
```