Strengthening innovation-driven inclusive and sustainable development

Asia-Pacific Tech Monitor

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Science technology and innovation for sustainable and resilient recovery from Covid-19 crisis

Plus

- Technology News and Events
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Asian and Pacific Centre for Transfer of Technology (APCTT)

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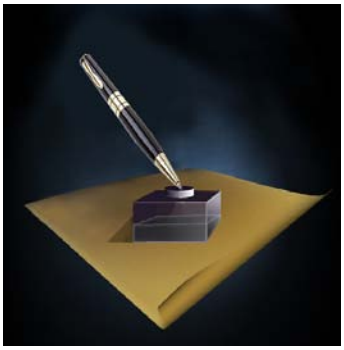

Introductory note

The worldwide outbreak of coronavirus disease 2019 (COVID-19) pandemic, resulting lockdowns and restrictions have imposed major challenges to public health and economic activities globally. The pandemic has rapidly impacted the way we live, do business, communicate with one another, learn and access information, and maintain our well-being. On several fronts, science, technology and innovation (STI) has come to the rescue of countries helping them to address the challenges of COVID-19.

Innovative technologies are playing a vital role to recover from the pandemic. Innovations help in preventing the spread of the infection and development of effective vaccines. The use of messenger RNA (mRNA) technology has led to remarkably safe and effective vaccines against the COVID-19 virus. Thanks to data analysis and predictive techniques including artificial intelligence and machine learning algorithms, it has been possible to analyze and understand the wide variety of impacts of the disease and develop specific technological solutions at a faster pace. For example, machine learning-based X-ray and CT analysis are being used as promising screening tools for COVID-19 to complement real-time PCR testing methods. Machine learning is also being applied for repurposing of drugs to treat COVID-19 infection.

New and emerging technologies are supporting economic recovery of countries through providing novel and efficient ways of conducting business, education, production, research and development. A study conducted by the Asian Development Bank, as highlighted in one of the articles of this issue, reveals that the pandemic triggered digital transformation of micro, small, and medium enterprises in Indonesia, the Philippines, and Thailand to recover and sustain their operations. These include improving Information and Communication Technology infrastructure, facilitating digital platforms for business and finance, teleworking, and utilizing digital finance platforms.

Specific economic activities being supported by innovative applications of technology are ensuring employees' safety, restoration of business operations and production, delivering online services, among others. Digital technologies have played a key role to sustain the functions of society and business during the pandemic, whether by enabling remote working, automating processes, or facilitating contactless transactions. For example, China has taken several measures to adopt online medical care, insurance payment, education, retail, and contactless delivery. China has also put in place regulations to provide a clear legal basis and technical specifications to protect personal information while using big data.

This issue of *Asia-Pacific Tech Monitor* discusses the challenges, strategies, and best practices with examples from the Asia-Pacific region to facilitate sustainable and resilient recovery from the COVID-19 pandemic through science technology and innovation.

Michiko Enomoto
Head, APCTT-ESCAP

Technology Market Scan

INTERNATIONAL

COVID-19 significant contributor to biopharmaceutical R&D spend

According to an analysis conducted by *BioWorld* of the 2020 financial reports filed by public biopharmaceutical companies with market caps greater than $1 billion, and excluding big pharma companies, the amount that was invested in research and development (R&D) during the year increased by 23% compared to the same period last year. The 100 companies that were included in the analysis collectively invested a total of $44 billion in R&D compared to almost $35 billion invested in 2019. Biopharma companies conducting research on therapies and vaccines to treat coronavirus disease 2019 (COVID-19) were a significant contributing factor to the jump in R&D expenses.

In the race to bring a safe and effective COVID-19 vaccine to the market, several companies made substantial investments into R&D. Novavax Inc., of Gaithersburg, MD, for example, reported its expenses were $401.2 million in the fourth quarter of 2020, bringing its total spending to $747 million, a 556% increase over the previous year. That was primarily due, the company said, to increased development activities relating to its NVX-CoV2373 COVID-19 vaccine, in a pivotal phase III study in the U.S. and Mexico. In February, the company began a rolling review process for authorization of the vaccine with several regulatory agencies, including the EMA, the FDA, the U.K. Medicines and Healthcare products Regulatory Agency, and Health Canada.

Cambridge, MA-based Moderna Inc. reported that its R&D expenses were $759 million for the fourth quarter of 2020 compared to $118 million for the fourth quarter of 2019. That brought expenses to $1.37 billion for the year, compared to $496 million in 2019. The 163% hike in spending in 2020 was largely attributable to clinical development of its messenger RNA (mRNA)-1273 COVID-19 vaccine and prelaunch inventory buildup prior to the emergency use authorization from the FDA.

The company raised the lower end of its global manufacturing plan for 2021 from 600 million doses of mRNA-1273 to 700 million doses and said it will make the necessary capital investments to increase the capacity up to an expected 1.4 billion doses in 2022. In terms of revenues from the sale of its vaccine, the company gave guidance that it has already signed advance purchase agreements for scheduled delivery in 2021 that will total $18.4 billion.

https://www.bioworld.com

ASIA-PACIFIC

CHINA

R&D spending rises 10% in 2020

China's spending on R&D hit a record high 2.4% of gross domestic product in 2020, according to preliminary data from the National Bureau of Statistics. China's total expenditure on R&D rose 10.3% from a year ago to 2.44 trillion yuan ($377.8 billion), the bureau said in a release Sunday. It's the slowest incremental growth in 5 years and down from 12.5% in 2019. China's top leadership is set to detail additional measures to support self-reliance in technology and innovation at the National People's Congress that kicks off this week.

The ruling Communist party will also announce economic and other policy targets for this year, the next 5 years, and through the year 2035, at the annual gathering. U.S. policies that seek to contain China's continued rise have given new urgency to Beijing's push for technology self-sufficiency. China has pledged to accelerate development of 5G technologies, semiconductor manufacturing, and other technologies seen as critical to the next stage of economic development. The R&D expenditure data released Sunday are subject to revisions, with the final 2020 tally expected later this year.

https://www.bloombergquint.com

R&D investment up in listed companies

A majority of China's A-share listed firms have allocated more funding to R&D investment since 2019, to be in lockstep with the nation's 14th Five-Year Plan (2021–2025) which prioritizes on home-technology innovation. In 2019, the R&D investment from China's A-share listed firms totaled 759.78 billion yuan ($116.74 billion), a year-on-year increase of 21.52%, the Securities Daily reported. As of March 12, 2021, among the A-share listed firms that have made public their 2020 financial reports, a total of 153 firms have invested 27.22 billion yuan ($4.18 billion) in R&D since 2020, a year-on-year increase of 19.46%.

Among the 153 firms, a total of 51 firms spent more than 100 million yuan ($15.36 million) on their R&D, and 5 firms spent more than 1 billion yuan ($0.15 billion) on R&D. A total of 18 firms invested more than 10% of their yearly operating income on R&D.

Aligning with the 14th Five-Year Plan, which prioritizes tech innovation, Premier Li Keqiang said in China's 2021 government work report that market-based mechanisms should be used to encourage businesses to innovate.

According to the 2021 central government work report, the 75% tax deduction policy for corporate R&D spending will remain unchanged, and the percentage of deductions for manufacturing companies will be increased to 100%. Tax incentives can be used to encourage businesses to increase their investment in R&D and develop innovatively.

https://www.globaltimes.cn

INDIA

Draft handbook of intangible technology transfer controls

On March 11, 2021, the National Association of Software and Service Companies (NASSCOM) submitted its feedback to the Ministry of Electronics & Information Technology (MeitY) on the draft Handbook on

Intangible Technology Transfer (ITT) Control ("draft ITT Handbook").

The objective of this ITT Handbook is to be used as a reference document for companies exporting dual-use items, software and technology which are covered under export control laws in India. It will fulfill the purpose of making companies, which engage in export of such controlled items/software/technology through intangible means, aware of their export compliance obligations. It is an important step towards India's commitment under the Wassenaar Arrangement to promote awareness of ITT controls.

The main recommendations on the draft ITT Handbook are the following:

1. Clarity around the audit mechanism: Clarifying that an audit mechanism here would entail submission of internal audit report by companies. This is for the reason that every company that indulges in transfer of controlled goods/software/technology, maintains and adheres to a strong Internal Compliance Program (ICP) or Technology Compliance Program (TCP), with the objective of ensuring adherence to export control obligations. One of the important elements of an ICP is conducting internal audit to perform ICP-related checks. Thereafter, an audit report is prepared, which may be submitted to the government, if needed. This report will provide a basis to the government to identify if a company's control measures are sufficient.
2. Suggestion to set-up helpdesk facility for SCOMET-related queries: The handbook suggests including a specific reference to supporting activities by the government by way of creating a helpdesk facility for all SCOMET-related queries, such as, SCOMET classification, application filing etc.
3. Clarity around visa-vetting requirement: Visa-vetting should be adopted as a control mechanism only in specific scenarios defined by the government. This is for the reason that companies implement sufficient internal security access pertaining to controlled technology for employees, visitors, and partners. Embedding visa vetting could potentially restrict the interaction required to support research and development activities for the industry and create additional administrative burden for both the industry and the government.
4. Use of consistent terms: There is a need to align definitions and terminology used in the draft ITT Handbook with the SCOMET List and Wassenaar Arrangement (WA), to avoid any ambiguities and maintain consistency with terminologies used at the international fora.

https://wire19.com

Policy thrust to export of R&D services

The soon-to-be-announced New Foreign Trade Policy 2021–2026 may give a special emphasis to export of research and development (R&D) services. A separate section focusing on R&D services exports is being planned, a government official said. The changes are being worked out by the Department of Commerce at the behest of the office of the Principal Scientific Advisor of India. The government had extended the validity of foreign trade policy 2015–2020 by a year—till March 31, 2021 due to the COVID-19 pandemic. The new policy is to be effective from April 1, 2021 for a period of 5 years.

The Department of Commerce has indicated that the policy's focus will be to channelize the synergies gained through merchandise and services exports for growth and employment with a goal to make India a $5 trillion economy. The department had in January informed the Parliamentary Consultative Committee of the Ministry of Commerce and Industry that the District Export Hubs initiative will form an important component of the new foreign trade policy.

"The Department of Commerce through the Regional Authorities of DGFT has engaged with State/UT Governments to take forward this initiative in the districts and enable its implementation in a phased manner, with the objective of mobilising the potential of each district of the country to achieve its potential as an export hub," it had stated.

https://www.businesstoday.in

Program to accelerate AI-led innovation

The National Association of Software and Service Companies (Nasscom) is launching an "AI Gamechangers" program to promote artificial intelligence (AI)-led innovation in the country, the apex body of the IT industry said. As part of the "AI for India" mission, the program seeks to recognize impactful and scalable AI-based innovation in the country. Nasscom and Microsoft will work closely to develop and promote the AI Gamechangers program, built on a shared commitment towards accelerating the adoption of AI across key sectors.

The program will recognize innovators for their successful AI implementation at Nasscom's Xperience AI Summit, one of the largest AI summits in India. "This will serve as a platform for startups, enterprises, academia, governments, and NGOs to showcase their AI based products and solutions, providing reach and impetus to drive AI innovation for the country," Nasscom said in a statement.

https://www.livemint.com

Trademark applications by startups rise

The number of trademark applications filed by startups in India under the Startup India scheme has grown to 14,252, as of March 14, 2021, according to government data. From four applications filed and two registered during the first year (2016–2017) of the scheme, startups have 6,630 applications registered so far (46.5% of filed applications), showed data from the Indian Patent office. The year-on-year growth in applications filed and registered has also been significant. 6,092 applications have already been filed in 2020–2021

so far, up from 4,130 applications filed in 2019–2020 and 2,596 filed in 2018–2019 while the registered application base has jumped from 1,789 in 2018–2019 to 2,428 in 2019–2020. As of March 14, 2021, the number of registered applications during the current financial year stood at 1,319, according to an analysis of data from the DPIIT 2020–2021 annual report.

However, startup trademark filing and registration represented only a minuscule part of the overall numbers. As per the Indian Patent Office FY19 report—latest available on its portal, 323,798 trademark applications were filed in India by businesses across sizes in comparison to 2,596 startup applications (0.8%). Likewise, the number of overall trademark registrations during the stood at 316,798 of which 1,789 applications (0.56%) belonged to startups.

The Government of India has been taking various legislative and policy reforming steps to strengthen the Intellectual Property Rights regime in the country keeping in view our developmental needs…statutory fees paid for trademark applications filed by a startup has been reduced to 50 per cent vis-à-vis large entities. A further concession of 10 per cent in prescribed fee is provided for online filing of applications," said Commerce Minister Piyush Goyal in a written reply to a question on startup trademark applications in the Lok Sabha recently. As of February 28, 2021, 13,703 trademark applications filed by startups have availed the benefit of a reduced fee, according to Goyal.

The government had also announced the Scheme for Facilitating Startups Intellectual Property Protection in 2016 to help startups in filing and subsequent processing of their applications. The scheme was later extended till March 2023. The government bears the cost of the facilitator who assists startups to file patents, trademarks, or designs. As of February 28, 2021, over 900 facilitators were registered with the office of Controller General of Patents, Design, and Trademarks of which 392 were registered for facilitation for trademarks under the Scheme, Goyal added. As of December 31, 2020, 2,546 applications were been filed by startups through facilitators.

https://www.financialexpress.com

NEPAL

Chemical fertilizer based on natural gas technology

Chemical fertilizer factory based on natural gas technology can be established and operated in Nepal, a preliminary study committee for the establishment of a chemical fertilizer factory formed under the coordination of Finance Minister Bishnu Prasad Poudel said in its report. The report mentioned that it is appropriate to set up a fertilizer factory based on natural gas technology as compared to other technologies from the point of view of initial capital investment, return on investment and profit.

The report also stated that the establishment of a fertilizer factory based on natural gas technology will provide a sustainable solution to the supply of fertilizer and contribute to the economic development of the country by increasing agricultural productivity. The committee has concluded that the subsidy amount allocated by the government could be saved by setting up a fertilizer factory based on natural gas technology in Nepal for the time being.

The government has allocated Rs 11 billion to provide subsidy to the farmers for the purchase of chemical fertilizers in the current fiscal year as compared to Rs 10.52 billion last fiscal year. The committee has stated that an initial investment of Rs 103 billion will be needed for the establishment of a chemical fertilizer factory based on natural gas technology, Rs 189 billion for water electrolysis technology, whereas thermocol technology is not appropriate because of managerial problems of chemical fertilizer and environmental factors.

https://myrepublica.nagariknetwork.com

PHILIPPINES

Patent generation and commercialization

Projects to generate and commercialize patented technologies will now enjoy incentives from the government as these activities have been added into the Board of Investments' (BOI) 2020 Investment Priorities Plan (IPP). Signed last February 9 by Trade Undersecretary and BOI head Ceferino Rodolfo, BOI Memorandum Circular 2021-001, which provides the implementing guidelines for the 2020 IPP, identified the commercialization of "uncommercialized patents" as one of the projects falling under the "Innovation Drivers" activity.

Uncommercialized patents refer to invention patents, utility models (UMs), or industrial designs (IDs) that have been granted patent or are registered at the intellectual Property Office of the Philippines (IPOPHL) but have not delivered economic returns, such as by means of a spin-off company, licensing or sale, among others.

The 2020 IPP also recognized Innovation and Technology Support Offices (ITSOs) as "Innovation Centers," or a community of entrepreneurs and researchers helping find breakthroughs and alternative solutions to address current industry challenges. A university, college, or research center that partners with IPOPHL, an ITSO offers access to patent and scientific and technical databases, assistance in using patent databases, training in patent claim drafting and advice on intellectual property (IP) management, among others.

ITSOs have played a big part in driving UM and resident-patent filings in 2019, in turn contributing to the Philippines' hike in the 2020 Global Innovation Index (GII) ranking. IPOPHL has 83 ITSO-partners to date.

The IPP's expansion of IP-related activities is one of the fruits reaped from IPOPHL's August 2019 memorandum of agreement (MOA) with BOI. The objective of the MOA includes incentivizing IP-generating activities. Other IP-related activities under the rolling 3-year plan include generating original content for books, originality being a key criterion for copyrighted works, and requiring business incubator hubs to provide IP management and legal consulting services.

https://www.pna.gov.ph

Innovation outputs

The Department of Science and Technology (DOST) is making "strategic and game-

changing" moves to boost innovation outputs in the country and help improve the Philippines' Global Innovation Index Ranking next year. The assurance was made by DOST Secretary Fortunato "Boy" T. de la Peña during the Innovation Forum hosted by the Department of Science and Technology–Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD).

"We do need more innovators, and we at DOST have made and are still making strategic and game-changing moves to achieve this. For example, we have increased our scholarship offerings at all levels from our Philippine Science High School scholars, to our baccalaureate scholars under the STEM (Science, Technology, Engineering or Mathematics), program and particularly the MS/PhD program including the programs where we can send graduate scholars abroad," he said. He cited that over the years, the Philippines is able to have some gains in innovation despite the limitations in resources. "Since we have joined the Global Innovation Index Ranking, we have moved from a low of 100 out of 135 countries, we moved gradually and as of 2020, we are already at rank 50 out of 131 countries. I hope that we can still improve this so that by 2022, we will be on top one-third out of all countries," de la Peña said.

"We also have new ways of delivering human resource development programs or courses online. For example, we have the SPARTA (Smarter Philippines through Data Analytics Research and Development) program which is an online program where people can upskill themselves on Data Science and Artificial Intelligence," the DOST chief said.

https://mb.com.ph

InnoHub for MSMEs' launched

The Industrial Technology Development Institute (ITDI) of the Department of Science and Technology (DOST) inaugurated its Modular Multi-Industry Innovation Center (MMIC), or "InnoHub sa Pinas," on February 18. The first in the country, the facility is for advanced scaled-up researches on food and nutraceutical products.

The InnoHub made the Philippines the fourth in the world to have such facility, Secretary Fortunato T. de la Peña said at the launching at the DOST Compound in Taguig City. "We are joining the ranks of Canada, Malaysia and Mexico in setting up this kind of innovation hub," de la Peña said at the news conference that was beamed online.

https://businessmirror.com.ph

REPUBLIC OF KOREA

R&D budget spending

The Republic of Korea's government said that it is seeking a 27.2 trillion won (US$22.8 billion) research and development (R&D) budget for 2021 to secure growth for future generations. The sum represents a 12.3% increase from 24.2 trillion won for 2020 and marks the second year of a double-digit annual rise following the 18% hike for 2020, the Ministry of Science and ICT said.

Of the total, roughly half, or 13.2 trillion won, will be injected into the so-called New Deal projects, helping combat infectious diseases, promoting development of industrial materials, components, and equipment, as well as supporting bio-health, future mobility, and system chips. The government said it will also allocate funding for basic R&D and fostering innovative researchers.

The ministry said it has earmarked 1.1 trillion won for the digital new deal effort covering artificial intelligence 5G mobile connectivity that can contribute to the digitization of the country's social overhead capital. A further 800 billion won will be used in the green new deal efforts centered on renewables.

The new year's budget will funnel 200 billion won into responding to infectious illnesses and dealing with outbreaks, with 170 billion won to be spent on finding local treatment drugs and vaccines for COVID-19. To help boost the materials, components and equipment sectors, the government will provide 2.2 trillion won to better respond to shifts in the global value chain caused by the pandemic and trade disputes. Seoul said it wants to spend 2.3 trillion won on bio-health, future mobility and system chips, which can all enhance the country's competitiveness in critical sectors, while 7.3 trillion won is to be provided for basic R&D and 300 billion won for promising scientists, to help the country stay abreast of the latest advances in science and technology.

https://en.yna.co.kr

R&D spending in 2019

The Republic of FONT Korea invested almost 90 trillion won (US$83 billion) in research and development (R&D) last year, making it the fifth-largest spender among members of the Organization for Economic Cooperation and Development (OECD), the ICT ministry said. The Republic of FONT Korean government and the private sector's total R&D spending in 2019 amounted to 89.05 trillion won, up 3.9% from the previous year, according to the Ministry of Science and ICT. The total R&D spending translates to 4.64% of the Republic of FONT Korea's gross domestic product (GDP) last year.

The ministry said the latest figures place the Republic of FONT Korea as the fifth-largest R&D spender and second in terms of R&D spending to GDP ratio among OECD countries, although figures for other countries are based on results from 2018. The United States was the largest R&D spender that year at a total of $581.6 billion.

The ministry said the Republic of FONT Korea's private sector spent 68.5 trillion won in R&D last year, accounting for 76.9% of the total, while public R&D spending amounted to 19.1 trillion won or 21.4% of the total. Companies' R&D spending in manufacturing amounted to 62.6 trillion won in 2019, up 2.3% from the previous year, while R&D in the service sector rose 21.6% to 7.6 trillion won over the same period.

The number of researchers in the country also increased 4.7% to 538,136 in 2019. Female researchers took up 21% of the total last year, lower than other major countries. The ministry said the United Kingdom's share of female researchers stood at 38.6% in 2018 and Germany at 27.9% in 2017.

https://en.yna.co.kr

VIET NAM

National Technology Innovation Fund

Prime Minister Nguyen Xuan Phuc has issued a decision promulgating the organizational and working statutes of the National Technology Innovation Fund (NATIF). Accordingly, the NATIF is a non-profit State financial fund which is subordinate to the Ministry of Science and Technology and not covered by the State budget. It operates as a single-member limited liability company with all of its charter capital owned by the State. It provides soft loans and guarantees loans or offers financial aid for enterprises, organizations, and individuals to research, apply, transfer, innovate, and complete technology.

The purpose of the fund is to assist businesses in transferring, innovating, and completing technologies that are encouraged to be transferred as stipulated in the Law on Technology Transfer; promote technology transfer to serve agricultural development in rural, mountainous, and disadvantaged areas; support the development of technologies and science-technology companies, as well as technology decoding; and aid the training of science and technology human resources to serve technology transfer, innovation, and completion.

The NATIF is tasked with receiving, managing, and using sources of capital such as the State budget, legal financial sources, and voluntary donations by domestic and foreign businesses, organizations, and individuals; selecting missions and projects to be supported by the fund; making rules on financial aid and deciding on support levels in a transparent manner; examining and managing mission and project implementation; and assessing implementation outcomes.

It has the right to suspend or take back financial aid if any of the assisted businesses, organizations, and individuals is found to have violated regulations on the use of the fund's capital. It can also deal with complaints or sue businesses, organizations, and individuals that infringe their contracts and commitments with the fund.

https://en.vietnamplus.vn

New Regulations on IPR

The Intellectual Property Office of Vietnam (VNIPO) recently issued Notice No. 13822/TB-SHTT (Notice 13822), which tightens the requirements for legal representatives of IP applicants or owners to sign documents on their behalf.

This latest notification is part of the government's efforts to improve the country's intellectual property (IP) system. In August 2019, the government issued the Intellectual Property Strategy 2030, which aims to develop a comprehensive IP system to not only provide protection but to foster innovation, and thus utilizing IP as a tool to enhance economic development and national competitiveness.

The strategy covers five main objectives, namely:

1. Place Vietnam among the leaders of creation and protection of IP rights in ASEAN by 2030;
2. The establishment of industrial property laws as well as plant variety rights to ensure greater transparency for applicants;
3. To improve IP laws and to significantly reduce the number of IP infringement cases;
4. To increase the quantity and quality of IP of Vietnamese individuals and organizations with indicators from the Global Innovation Index (GII); and
5. To enhance the effectiveness of IP utilization, such as increasing the number of commercially exploitable patents as well as the number of enterprises using IP tools in their production, among others.

What does Notice 13822 entail?

Notice 13822 impacts applicants who are individuals or organizations and affects both local and foreign IP applicants or owners in Vietnam. The new regulation implements a more rigid system for the definition of "representatives" in order to ensure greater validity in any documents submitted in addition to maintaining procedural consistency for applicants pursuing IP registration.

What if the signatory is an individual?

In individual cases, the representative of the individual is the legal representative as authorized by the applicant through the Power of Attorney (PoA). The PoA must now be signed by the applicant, and the authorization of their representative and must comply with articles three and four of Circular No. 01/2007/TT-BKHCN—an implementing regulation of the IP Law.

What if the signatory is an organization?

Under the new notification, all documents have to be signed by the legal representative of the applicant or owner such as the company president, CEO, general director, or chairman of the board and so on. If the documents are signed by others (such as the head of department, secretary, or officer), then evidence showing that these persons have the power to represent the IP owners is required. If there is no evidence, then the document must be legalized or notarized.

What if the signatory is an IP agent?

If the legal representative of the IP owner or applicant is an IP agent, they would need to submit evidence of this relationship through a written PoA.

Start preparing though further clarification likely

The notification doesn't specify when this practice will take effect or if it will apply to previous cases, though we can expect the authorities at the IP office to apply this with immediate effect. The authorities may issue further guidance on implementing the new notification to clarify further. Nevertheless, potential and current IP owners should contact the services of an established local consulting firm, to ensure that they understand and meet these new requirements, as it could lead to their applications being rejected by the VNIPO.

https://www.vietnam-briefing.com

ASIA-PACIFIC

AUSTRALIA

AI for biosecurity scanning

Authorities at the Port of Brisbane are working with artificial intelligence (AI) experts to test a homegrown image recognition system capable of scanning the exterior of a shipping container for traces of exotic insects within the 4 seconds between when it is lifted off a cargo ship and deposited on the docks.

With more than 8 million shipping containers moving through Australian ports every year, scale has always been a challenge in maintaining biosecurity controls that are essential to protecting native crops and animals from infection with novel pathogens. Such inspections have typically been conducted through spot checks—but with high volumes a constant challenge, Department of Agriculture authorities were naturally keen to explore ways that AI technology could help.

The current trials have paired Port of Brisbane biosecurity authorities with the Department of Industry, Science, Energy and Resources; the Department of Agriculture Water and the Environment; Canberra-based AI firm Trellis Data; and Brisbane-based global logistics company DP World. Using high-resolution cameras mounted along the path taken when containers are unloaded, images of the shipping containers' exteriors are fed into the Trellis Intelligence Platform—which scans them for insects and tell-tale signs of their presence such as webs, eggs, or casings.

Given that many of the insects in question are under 10 mm in size, "finding those insects is probably one of the more complex [applications] we are undertaking at the moment," product manager James Meszes told *Information Age*. Challenges include both the logistics of both scanning different-sized containers in a range of orientations at high speeds, and of providing 24 × 7 scanning in a broad range of ambient lighting and weather conditions.

https://ia.acs.org.au

CHINA

AI system for detecting COVID-19 Researchers at The Chinese University of Hong Kong (CUHK) have developed an artificial intelligence (AI)-based system for the automated, rapid and accurate detection of COVID-19 infections in chest computed tomography (CT) images. The system can provide immediate results, without the need for clinicians to interpret images. It could be potentially used in radiology imaging departments in hospitals. The CUHK team already has put the system to the test. Experimental outcomes have revealed that the AI model managed to yield a competitive performance in lesion detection in comparison with radiologist interpretation of chest CT scans across local, regional, and global patients. Its wide validation and applicability on cohorts with various imaging scanners and different demographics show that the established AI model holds great potential in complex real-world situations.

https://www.bioworld.com

Anti-epidemic protection in the post-COVID era

In response to the epidemic prevention policy in the wake of COVID-19, hygiene control in enterprises and households is more important than ever. In the post-COVID era, Taikkiso launched a new UVC LED device, which can be applied to water, surface, and air sterilization. In the water sterilization treatment market especially, Taikkiso and their partners have made significant breakthroughs in technology, bringing better protection for all.

This newly developed UVC LED faucet module boasts high power intensity with a sterilization capacity of 99.99%, while maintaining a water output of 2LPM, which takes the range of applications a step further. Looking at the domestic and international markets, the comprehensive advantages of this UVC LED faucet will be difficult to surpass in the short run.

In addition to the application of faucet-based water purification, Taikkiso's UVC LED can also be used for surface and air sterilization. With the continued development of more product applications, sanitation and hygiene can be greatly improved and provide people with a safer living environment.

The UV-C LED water sterilization treatment has a wide range of applications, including:

- Water outlet application (such as: faucets or shower heads)
- Filtration equipment
- Water entry point application (e.g., water tower)

https://www.taiwannews.com.tw

INDIA

Air purifier that "kills" 99% coronavirus

O2Cure, a Gurugram-based startup, has developed a product to neutralize SARS-CoV-2 virus that causes COVID-19. The Plug & Play product is designed with RGF's patent PHI technology by the company which is a leading air purification solutions provider in the country.

RGF's patented REME with PHI-Cell technology has been successfully tested by CCMB-CSIR virology lab in India for reduction of SARS-CoV-2 by 97.48% and by Innovation Bio-Analysis lab in USA for reduction of SARS-CoV-2 virus by 99% from air and surface.

It said that Plug & Play is a lightweight purifier which kills SARS-COV-2 or Covid-19 from air and surfaces 99.63% within 1 hour. Kartik Singhal, founder of O2Cure, said that the product has been designed to cater to the need of Indian and abroad consumers, especially in densely populated cities where people are vulnerable to air pollution. He said that other products also prevent from other air contaminants. The machine, he said, has grilles that suck the air in and release purified air from the vents, covering an area of 500 sq ft.

https://www.indiatvnews.com

Machine learning innovation to help MSMEs

MSMEs (Micro, Small and Medium Enterprises) have been a significant contributor to India's GDP, manufacturing output,

and exports. However, despite this huge impact of MSMEs on the Indian Economy, the sector is always crippled by the lack of access to credit.

Lendingkart has developed an alternative underwriting mechanism based on alternate customer data, including bank data, social media data, and GST data. Coupling the available data with a machine learning algorithm equips lenders with an advanced system that assesses risks and approves loans at a much larger scale and lower costs. As a result, the company has been able to reduce credit decisioning time and is ensuring access to financial service for a customer without any delay in processing.

Lendingkart pioneered the Cash Flow-based Lending System by developing algorithmic underwriting models which includes customer details and information during the application, credit bureau data, and cash flow data compiled through bank statements. The algorithm ingests the three types of data and creates 5,000+ derived variables. These variables include aggregate variables (min closing balance months, max credit months, wallet share by FIs), trended variables, negative variables (no. of cheque-returns, credit decline, written off), momentum variables (QoQ/HoH/YoY growth/decline in balances), and balance transfers triggers.

The company uses advanced machine learning techniques and an open-source software library, XGBoost, with an explainability feature. The Lendingkart scoring platform, on the other hand, is a platform-as-a-service, hosted on AWS and developed using Python. It uses the Apache Kafka framework for real-time scoring and involves a slew of different services, including A/B distribution, insurance APIs, amount policy configuration etc. "The average time to score an application is approximately 3.5 secs."

After a comprehensive model development journey—from manual interventions to closing the feedback loops to automated underwriting algorithms—the company has managed to dial up the approval rates by approximately 50%. Further, Lendingkart was able to track the portfolio performance for early warning indicators as well as portfolio benchmarks. The model has also been continuously fed with any anomaly, industry changes and trends for training.

https://analyticsindiamag.com

AI-based Covid testing facility

India's first Artificial Intelligence-enabled Covid-19 testing facility for international passengers has commenced operations at Terminal 3 of the Indira Gandhi International (IGI) Airport in New Delhi. The facility under the Garuda brand name is owned by AI company Thalamus Irwine. According to the company, the facility is run by an AI system using computer vision technology and a paper-free backend for processing mass volumes of international passengers. Presently, destination countries require an 'Antigen Test' negative report to allow the passengers inside their jurisdictions.

Industry players such as Lufthansa, KLM, and Air France, among others, have had success using the facility. After the test, passengers get their results in 10–15 minutes on their mobile phones. As per the company, the passengers of an entire international flight can be tested within a couple of minutes by using the "scalable node architecture," "complete digital systems for patient entry," "AI driven process improvement," and "SoP management." Besides, IGI Airport's HOI app allows for seamless management of patient flow to the facility.

In terms of the technology, the system even monitors the SoPs and ensures employees and users are maintaining high levels of security and compliance standards in the sample processing room. It cited that the facility eliminates majority of the bottlenecks associated with the need to test multiple passengers in quick succession. The Cloud-based infrastructure also ensures independence from physical storage on premise.

Furthermore, the facility offers several firsts such as AI-based monitoring of every move the staff makes, so as to monitor the safety protocols such as adherence to SoPs during sample collection etc. In case the SoPs are flouted, the system intervenes by alerting the employees to correct their behaviour and also informs the store manager. In addition, the AI ensures there aren't discrepancies between the results entered by the employees with those generated by the system. Notably, the system acts as a second layer of protection to eliminate incorrect entry of data.

https://www.india.com

Technology simplifies buying insurance products

The insurer you need to go for are the ones who are using modern AI and digital technologies to resolve the problems and offer better claim settlement experience in addition to online buying experience. Insurers like HDFC ERGO and Bajaj Allianz have introduced Alexa-based voice assistants. Moreover, insurers are providing tele-consultation for free to facilitate better healthcare at home. Reliance Jio recently unveiled its AI Video call assistant for customer support. Such AI powered video-bots are mostly in the early phase of development and are expected to revolutionize customer support by giving a human touch to automated responses that are available 24/7. With startups like Rephrase.AI converting text chatbots into video chatbots, customer experience is all set to become a lot more convenient with voice-based interaction.

Insurers like ICICI Lombard and Bajaj Allianz launched InstaSpect and MOTS, their respective AI-based damage assessment services for instant renewal of motor insurance policies. By simply uploading pictures of your vehicle, you can get insurances policies issued or renewed faster than ever before.

In case of health insurance, queries on missing documentation, treatment guidelines, unnecessary costs can be raised with hospitals or customers upfront on the app or portal, in order to avoid multiple back and forth exchanges. In India, insurers like ICICI Lombard, Bajaj Allianz, Aditya Birla Health, etc. have already implemented AI claim settlement.

https://www.financialexpress.com

App to monitor Covid vaccination

The state of Andhra Pradesh has developed an app for online monitoring and capturing of individual vaccination data/information from anywhere in the state. Officials said the app is developed for online monitoring and capturing of individual vaccination data/information from anywhere in the state. All Medical officers would use this app to enter the vaccinated individual's details as and when he/she got vaccinated, said state Covid nodal officer Dr. Arja Srikanth. Every medical officer has been provided with user name and password. Each medical officer's login provides entire district lists of unvaccinated frontline workers and healthcare workers.

Details of a healthcare worker or frontline worker can be searched using registration ID or mobile number or name. An SMS alert will be sent to each frontline and healthcare worker›s mobile, as per time slots. The official said as per the instruction of Chief Minister Y.S. Jagan Mohan Reddy, the state administration is geared up to complete vaccination of all its almost half a million healthcare workers and frontline workers. He described this as another important initiative by the state to care its frontline workers who in turn are equipped to fight pandemic effectively.

https://health.economictimes.indiatimes.com

JAPAN

New technologies to counter Coronavirus

Japan's Institute of Physical and Chemical Research, or RIKEN, working in collaboration with Fujitsu, has developed the supercomputer Fugaku, currently the most powerful in the world. It went into operation in 2020, just in time to be put to use in combating the fast-growing COVID-19 crisis.

Some of the first questions that Fugaku was tasked with answering involved the spread of the coronavirus through the air. By itself, the virus does not appear to be airborne, rather it travels inside droplets of fluid on the air, such as those released when an infected person coughs or sneezes. Fugaku was capable of running detailed simulations of how fluid particles can move through the air, allowing researchers to assess the risk levels not only from coughing, but also when speaking or singing. The simulations also provided convincing evidence that masks have a significant effect on reducing exposure, especially when worn by people who are infected. These findings were a tremendous help to public health authorities in providing safety guidelines that were clear, effective, and backed by evidence.

A further application of Fugaku has been in simulating the interaction between the proteins on the coronavirus and a wide range of medications. In just 10 days, Fugaku was able to test over 2,000 drugs, identifying dozens that showed promise as potential therapeutic treatments. No other computer or testing system developed so far has been able to produce so many results so quickly, and this has the potential of not only producing effective treatments for those infected with COVID-19, but a wide range of other diseases as well.

Recognizing the urgent need for safe and effective sterilization technologies that can be used in large occupied spaces, Ushio Inc. of Japan developed their Care222® lamp module. The technology uses a combination of an excimer lamp that emits ultraviolet light concentrated around the 222-nanometer (nm) wavelength, and a unique filter that blocks potentially harmful photons above 230 nm from being emitted.

Ushio's Care222® i Series is capable of disinfecting spaces up to 2.5 meters away in only 6.3 minutes, killing 99% of viruses. This allows it to be installed in ceilings where it can be used to continually disinfect public spaces where many people make physical contact with surfaces, such as entrances, hallways, meeting rooms, or restrooms, as well as frequently touched items such as handrails and doorknobs. With this technology, businesses and public facilities can continually contribute to protecting their employees and visitors.

Professor Takayuki Murata of Fujita Medical University in Aichi Prefecture, not far from Nagoya, began investigating whether ozone could be safely used as a preventive measure against coronavirus. Professor Murata's team looked into whether ozone could be effective against coronavirus at concentrations low enough to be safe for people. The maximum limit for ozone was set at 0.1 part per million (ppm), so they began their investigations with concentrations of just 0.1 ppm. What they found was that maintaining a continuous low concentration could kill about 95% of infectious viruses within 10 hours. Furthermore, at concentrations of just 0.05 ppm, a level that is completely safe for people, the same reduction in virus levels could be achieved in 20 hours. This meant that very low concentrations of ozone could be used to continuously disinfect high-traffic areas. Professor Murata's findings have already led several hospitals to install ozone generators in their waiting areas and patient rooms, and they are starting to be adopted for use in taxis and public transportation.

https://www.reuters.com

MALAYSIA

Tower simulator for airport

A large TotalControl tower simulator at Malaysia's Mukah Airport has been successfully tested and installed remotely, in another example of an innovative approach to simulator delivery by Airways International Ltd (AIL) during the COVID-19 pandemic. AIL partnered with International Aeradio Sdn Bhd Ltd—a Malaysian-based integrator of aviation technologies to provide a turnkey simulation solution for use by air traffic controllers at the new Mukah Airport. A 220° LCD tower simulator has been installed and commissioned, along with a procedural simulator which will shortly be operational following the US$70 million airport development.

The Mukah Airport simulator is the second TotalControl simulation project to be successfully completed as a remote

installation. It follows the 8-month project to remotely install a suite of TotalControl simulators for Avinor Air Navigation Services, Norway completed in early March 2021.

The TotalControl simulation solution will be used by Malaysian air traffic controllers for training at Mukah Airport, where they can control traffic in exercises that mimic the real world. The simulator imitates the full air traffic control flight information region and utilizes AIL's unique TrueView technology for life-like graphics—enhancing the quality and speed of ATC training and significantly reducing on-the-job training time. With COVID-19 presenting a significant disruption to the aviation industry, AIL quickly recognized that a new approach to simulator deliveries was needed. Its innovative, cost-effective remote installation solution enables air navigation service providers to continue ATC training during lockdowns and travel restrictions.

https://asianaviation.com

SINGAPORE

Portable arm rehabilitation device

A new portable arm rehabilitation robot will help patients to carry out robot-aided therapy at home, allowing them to perform intensive exercises without visiting hospitals or clinics, which can possibly reduce the risk of exposure to infectious diseases such as COVID-19. The robot can also be used in hospitals and outpatient facilities such as nursing homes and clinics. The compact robot, known as the H-Man, has demonstrated its efficacy in helping patients improve their upper-limb mobility in a clinical trial involving 60 stroke patients undergoing rehabilitation therapy.

Currently, most robots that are used for rehabilitation purposes weigh up to 70 kg, require special reinforced housing, are very costly, and are located at hospitals where their operation is managed by occupational therapists. In comparison, H-Man weighs 14 kg and can be placed on a normal table. Consisting of a handle shaped like a joystick and a large screen, the patient performs prescribed tasks shown on the screen such as playing a game, while the robot evaluates his or her progress and sends feedback to therapists wirelessly.

The smart robot was developed over 8 years by scientists from Nanyang Technological University, Singapore (NTU Singapore) in collaboration with rehabilitation physicians and occupational therapists from the Centre for Advanced Rehabilitation Therapeutics (CART) at Tan Tock Seng Hospital (TTSH) Rehabilitation Centre. With the successful completion of the clinical trials, the technology was commercialized and spun off into ARTICARES by NTUitve, NTU's enterprise and innovation company. In the short span of 3 years, ARTICARES has grown into a successful company with strong international presence including in Australia, Germany, and China.

In the clinical trials, patients using H-man successfully improved in their mobility at the same rate as conventional therapy. An assessment of their Fugl-Meyer Assessment (FMA) scores showed an average increase over 6 weeks of training of 46% for H-Man compared to conventional therapy and long-term retention of learning observed at follow-up stage with FMA was also on average observed to be 20% higher. Four of the subjects, successfully trained with the H-Man in their own home for 3 days, this time, under the supervision of their carers.

Specially designed games for helping patients stay motivated and learn in a fun way are displayed on the H-Man screen. Patients play the games using a joystick-shaped handle that can sense the patient's arm strength and increase or decrease the difficulty of performing tasks in a lot of different therapeutically beneficial ways, based on the patient's individual needs, thus helping them to relearn sensorimotor control and apply it to activities for daily living.

The device is easy to set up and use and H-Man can be equipped with a variety of soft-touch handles, including sensor-embedded handles, to suit the needs of the user and his/her therapist. To control the games and programming on the H-Man, a digital platform called CARE has been designed based on inputs and feedback from TTSH rehabilitation physicians and occupational therapists. An automatic reporting feature also allows clinicians to track their patients' recovery remotely.

https://www.news-medical.net

Robot for swab tests

Singapore has developed a robot that carries out nasal swabbing to diagnose COVID-19, in a bid to reduce healthcare workers› risk of exposure to the deadly coronavirus. Clinicians from the National Cancer Centre Singapore (NCCS) and Singapore General Hospital (SGH) have partnered with Biobot Surgical, a firm specializing in medical robotics technology, to develop the SwabBot, Channel News Asia reported.

The self-administered robot, that automates the taking of COVID-19 swab tests, will help reduce healthcare workers' risk of exposure to the coronavirus, it said. The robot helps address the limitations of manual COVID-19 swab tests by reducing the need for trained manpower, standardizing the consistency of the swabs taken and "providing greater throughput" of swab tests as the robot does not suffer from fatigue, the three groups said in a statement.

The SwabBot is a "self-administered" robot, meaning patients can activate and terminate the process at will. When a patient is ready, they can use their chin to activate the robot and start the swabbing process. The robot then extends the swab through the nose to the back of the nasal cavity, which is typically about 10 cm from the nostrils.

https://health.economictimes.indiatimes.com

Tech helps power Covid-19 vaccination drive

In the race to get Singapore vaccinated against Covid-19 on schedule, technol-

ogy has proven to be an invaluable tool. This digital backbone includes built-in solutions to pick up data discrepancies, as well as the flexibility to adapt to new circumstances should Singapore's vaccine strategy shift.

One solution involved developing software to catch errors—which can arise from people wrongly keying in their personal information when making vaccination appointments—before these are logged into databases and require human intervention to fix. In other cases, foreigners may obtain Singapore citizenship between doses, causing the system—which tracks individuals by their identification numbers—to mistakenly identify them as having taken only a single dose.

In the initial stages of the vaccine roll-out in January, IHiS processed between 4,000 and 5,000 vaccination records daily. Each day, inconsistencies would feature in around 200 records, which would have to be corrected manually. Today, its system logs up to 50,000 records a day. But software improvements have seen the number of cases requiring follow-up dwindle to just 20.

It usually takes 10 days and many hands to transform an empty room—usually a multi-purpose hall in a community club—into a full-fledged vaccination center. Apart from ensuring the IT systems run smoothly, operators also have to train staff and have backup plans to keep vaccines chilled should the main power supply fail. Some also add personal touches—for instance, setting up selfie walls for people to snap post-vaccination photos or giving away face masks.

https://www.straitstimes.com

VIET NAM

COVID-19 prevention, control products

Students and scientists at the Viet Nam National University Ho Chi Minh City (VNUHCM) have carried out extensive research and developed products that help prevent the spread of COVID-19. Out of 2,000 projects from 79 countries, one on producing protein from Ecoli bacteria in laboratories by a student team from the University of Science won sponsorship from the Agence Universitaire de La Francophonie—a society of universities offering training in the French language.

Firstly, they collaborated with a company in the bio-technology industry to carry out the project under Dr. Nguyen Thuy Vy, head of the genetics department at the university's biology and bio-technology faculty. The research was prompted by the fact that asymptomatic COVID patients and those with mild symptoms were believed to be a hurdle to control the pandemic in the community.

To detect infection, many countries use antibody tests. The advantages of this method are that it is fast, easy to deploy on a large scale, and has great accuracy. However, Viet Nam does not have suppliers of SARS-CoV-2 viral protein antigens, making it difficult for companies to seek for manufacturing antibody testing kits. Dr. Nguyen Thuy Vy said: "We use a technology to produce protein from Ecoli bacteria at low cost. Around the world, most proteins are produced from animal tissue." Vy and two students, Le Tran Dang Khoi and Vo Ho My Phuc, began the research in early June with sponsorship from AUF and they created products within 3 months.

The VNUHCM's National Key Laboratory of Digital Control and System Engineering (DCSELab) collaborated with the Centre of Science and Technology Development for Youth to make a mobile disinfection chamber. With sensors detecting and automatically spraying once a person steps in, signal lights, and a 360-degree fog mist sprayer, the chamber uses anolyte solution and ultraviolet, ozone, and heat disinfection technologies to help disinfect the whole body. The chamber has been used at several hospitals in the city since the COVID-19 pandemic broke out.

DCSELab's scientists also made an automatic chamber for disinfection and obtaining samples from patients without making contact. The chamber disinfects automatically before the next person enters for giving samples. Though ultraviolet disinfection technology is used, the UV rays do not directly touch peoples' bodies and so are not harmful to health officials or patients. Moreover, the high-efficiency particulate air filter technology combines with UV to completely kill viruses and bacteria remaining in the air after being sucked out of the chamber.

The other COVID-19 product by DCSELab is a simple ventilator working on the principle of automatically squeezing and releasing Ambu bag to deliver air into a patient's lungs. The product is being finalized after many revisions and consultancy from specialists at Cho Ray Hospital and the University of Medicine and Pharmacy. Another VNUHCM's member university, the University of Technology, has innovated dozens of useful and convenient products to serve the community in terms of COVID-19 prevention and containment.

Scientists at the Bach Khoa Research Centre for Manufacturing Engineering at the University of Technology have also made a mobile disinfection system with air filters to ensure clean air is discharged in the environment. The technology has been transferred to companies for commercialization and mass production.

A research team at the University of Technology's material technology faculty has made masks that could be used by healthcare workers for continuous hours. Lecturers at the University of Technology's mechanical engineering faculty made an automatic machine for sewing masks from anti-bacterial clothing. Besides, the university's lecturers and students made goggles that keep out aerosols from patients using 3D printing technology and sanitizers.

https://indiaeducationdiary.in

EUROPE

Space technology to build an ICU train

With Covid-19 continuing to cast a shadow over billions of lives, the European Space Agency (ESA) has selected a concept to develop an Intensive Care Unit train (ICU Train) following a call for proposals in

March 2020, when the first wave of lockdowns began to be imposed around the world. It will leverage space-based technology, such as geo-positioning and satellite communications, to enable advanced telemedicine and remote diagnosis while travelling, allowing on-board healthcare personnel to remotely consult specialists and conduct joint assessments. Combining space, rail, cybersecurity, and artificial intelligence-based technologies will facilitate remote medical analysis and consultations that require data exchange and high security standards.

The ICU Train will also incorporate additional intensive care stations to transfer patients who require assistance quickly, safely, and relatively cheaply in health emergencies such as Covid-19. The ESA awarded a group of companies from investment network the Angel Group, including Sitael, MerMec, Eikontech, and Brightcyde, along with Skycomm, with a contract to develop the ICU Train. The vehicles and rail facilities for the project will be provided by Italian national operator Trenitalia, while the Puglia Health Department in southern Italy will contribute scientific and health support.

Testing operations on the new ICU Train are earmarked for the first half of 2021. The project was selected after around 130 ideas were submitted in response to a call for proposals organized under the ESA's Space Solutions programme, which is sponsored by the Italian Space Agency (ASI).

https://www.railway-technology.com

UK

Robotics-driven COVID-19 mass testing platform

UK diagnostics firm Salient Bio has announced the commercial roll out of its robotics-driven COVID-19 mass testing platform. It is the company's first commercial offering as part of a wider strategic aim to provide affordable, effective, and easy-to-access preemptive diagnostic solutions for a broad range of medical conditions, which facilitate early intervention and improve overall health outcomes. The London-based spinout has been founded by former team members of Imperial College's London BioFoundry, which accelerates the commercialization of synthetic biology research and technology.

With continuous testing vital for high human contact industries such as food preparation, factory work construction, and education, Salient Bio's offering facilitates COVID-secure environments at a quicker and more cost-effective rate than the closest approved competitor, with a same-day results notification process and a very cost-effective per unit price for businesses conducting mass testing.

The platform's accuracy, fast delivery, and cost-effectiveness will be attractive to a range of sectors that require a safe environment for regular human contact such as logistics, facilities management, education, and manufacturing. The limited early rollout of the platform has already yielded partnerships with companies in the financial, sports, and entertainment sectors, among others.

The platform is reagent agnostic, meaning that disruption in supply chains can be mitigated by a shift to different reagent suppliers without it calling for wholesale infrastructure change at Salient's labs, therefore limiting disruption and costs. This is an important factor when considering the existing fragility in supply chains caused by COVID's disruption to logistics and the demand for continuous delivery of supplies for repeat testing at workplaces.

https://www.news-medical.net

Digital breakthrough could revolutionize the drug industry

In June 2020, the U.S. government purchased the vast majority of world's supply of remdesivir—a FDA-approved antiviral treatment for Covid-19—for July through September. Gilead, the company that makes the compound, recently announced that it would meet international demand by the end of October. Yet all along, digital instructions for whipping up a batch of the nearly 400-atom molecule at the push of a button have been sitting on Github, an online software repository, freely available to anyone with the hardware needed to execute the chemical "program."

A dozen such chemical computers or "chemputers" sit in the University of Glasgow lab of Lee Cronin, the chemist who designed the bird's nest of tubing, pumps, and flasks, and wrote the remdesivir code that runs on it. He's spent years dreaming of a future where researchers can distribute and produce molecules as easily as they email and print PDFs, making not being able to order a drug as archaic as not being able to locate a modern text.

Cronin and his colleagues described their machine's capability to produce multiple molecules last year, and now they've taken a second major step toward digitizing chemistry with an accessible way to program with the machine. Their software turns academic papers into chemputer-executable programs that researchers can edit without learning to code. The team represents one of dozens of groups spread across academia and industry all racing to bring chemistry into the digital age, a development that could lead to safer drugs, more efficient solar panels, and a disruptive new industry.

The Cronin team hopes their work will enable what they describe as "Spotify for chemistry"—an online repository of downloadable recipes for important molecules that they say could help developing countries more easily access medications, enable more efficient international scientific collaboration, and even support the human exploration of space.

At the heart of Cronin's new work lies what he calls a chemical description language or XDL (the "X" is pronounced "kai" after the first letter in the Greek word for chemistry). XDL is to the "chemputer" as HTML is to a browser—it tells the machine what to do. The group has also created software called SynthReader that scans a chemical recipe in peer-reviewed literature—like the six-step process for cooking up remdemisvir—and uses natural language processing to pick out verbs like "add," "stir," or "heat"; modifiers like "dropwise"; and other details like durations and temperatures. The system translates those instructions into XDL, which directs the chemputer to

execute mechanical actions with its heaters and test tubes.

The researchers tested the system, and no dumpsters burned. The group reported extracting 12 demonstration recipes from the chemical literature, such as the numbing anesthetic lidocaine, all of which the chemputer carried out at efficiencies similar to those of human chemists.

https://www.cnbc.com

NORTH AMERICA

CANADA

AI-driven technology

The MiQro Innovation Collaborative Centre (C2MI), a microelectronics systems research and development centre, recently selected Honeywell for its new thermal screening and risk self-assessment process for its Bromont, Quebec-based facility. The goal is to better sustain operations and to help improve the well-being of building occupants and visitors. C2MI is an internationally known microelectronics research centre that requires 24-7 laboratory access for its team and collaborators. The COVID-19 pandemic challenged its standard operations and ability to provide laboratory access while limiting potential virus exposure.

Honeywell worked with C2MI to install a thermal camera solution to screen elevated skin temperatures and risk self-assessment to streamline building access control without the need for human interaction. Using artificial intelligence (AI), the Healthy Building Kiosk thermal sensor monitors for trends and leverages variables such as the outdoor temperature to provide more accurate readings.

If an elevated skin temperature is detected, the staffer or visitor is referred for testing before being authorized to access the centre. The solution allows C2MI security staff to focus on other critical tasks and gives building users shared accountability.

https://www.ept.ca

USA

AI system to identify drugs to protect from Covid-19 severity

Researchers of the Massachusetts Institute of Technology have developed a system to identify drugs that can be repurposed to protect the elderly from coronavirus severity. "Making new drugs takes forever. Really, the only expedient option is to repurpose existing drugs," said Caroline Uhler, an associate member of the Broad Institute of MIT and Harvard.

Uhler and the team have developed a machine learning-based approach to identify drugs already on the market that could potentially be repurposed to fight Covid-19, particularly in the elderly. The system accounts for changes in gene expression in lung cells caused by both the disease and aging.

According to the researchers, this combination could allow medical experts to effectively seek drugs for clinical testing in elderly patients, who are more prone to severe symptoms. The researchers pinpointed the protein RIPK1 as a promising target for Covid-19 drugs, and they identified three approved drugs that act on the expression of RIPK1. The researchers also added that the stiffening lung tissue in the elderly shows different patterns of gene expression than in younger people, even in response to the same signal. This makes them more vulnerable to any infection.

To select approved drugs that might act on these pathways, the team turned to big data and artificial intelligence. The researchers focused on the most promising drug repurposing candidates in three broad steps. First, they generated a large list of possible drugs using a machine learning technique called an autoencoder. Secondly, they mapped the network of genes and proteins involved in both aging and SARS-CoV-2 infection. Finally, they used statistical algorithms to understand causality in that network, allowing them to pinpoint "upstream" genes that caused cascading effects throughout the network.

In principle, drugs targeting those upstream genes and proteins should be promising candidates for clinical trials. The autoencoder scoured the data sets to highlight drugs whose impacts on gene expression appeared to counteract the effects of SARS-CoV-2. The findings of the study were published in the journal *Nature Communications*.

https://www.thehindubusinessline.com

AI tool to speed up analysis of vaccines

Researchers have developed a new method to counter emergent mutations of the deadly coronavirus and hasten vaccine development to stop the pathogen responsible for killing thousands of people and ruining the economy, according to a study. The research team at the University of Southern California Viterbi School of Engineering, using artificial intelligence developed a method to speed the analysis of vaccines and zero in on the best potential preventive medical therapy, the varsity said in a statement.

The method is easily adaptable to analyze potential mutations of the virus, ensuring the best possible vaccines are quickly identified—solutions that give humans a big advantage over the evolving contagion. Their machine learning model can accomplish vaccine design cycles that once took months or years in a matter of seconds and minutes, the study says.

When applied to SARS-CoV-2—the virus that causes Covid-19—the computer model quickly eliminated 95% of the compounds that could have possibly treated the pathogen and pinpointed the best options, the study says. The AI-assisted method predicted 26 potential vaccines that would work against the coronavirus. From those, the scientists identified the best 11 from which to construct a multi-epitope vaccine, which can attack the spike proteins that the coronavirus uses to bind and penetrate a host cell.

https://health.economictimes.indiatimes.com

COVID-19 Impact on Digitally Operated MSMEs

Key Findings from the MSME Surveys in Indonesia, the Philippines, and Thailand

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Abstract

The coronavirus disease 2019 (COVID-19) pandemic has brought about forced changes of people's lives and work styles as fit to contactless societies under the "new normal." Digital transformation would be an inevitable action for micro, small, and medium-sized enterprises (MSMEs) to survive during the pandemic. This article examines the COVID-19 impact on digitally operated MSMEs, using evidence obtained from ADB's MSME surveys in Indonesia, the Philippines, and Thailand. The study found that the pandemic triggered MSMEs to go digital but digital transformation has yet to be established stably among them. The compressed demand and supply disruptions continuously affected MSMEs' revenue and financial conditions throughout a year of the pandemic, more seriously in digitally operated MSMEs. Work-from-home (WFH) or teleworking has gradually become a major work style for MSMEs, but many still have faced the difficulty in adopting WFH. Digitally operated MSMEs have stronger needs on information and communication technology (ICT) infrastructure improvement, facilitation of digital platforms for business and finance, and financial assistance on teleworking from the government.

Introduction

One year after the coronavirus disease 2019 (COVID-19) pandemic was declared by the World Health Organization in March 2020, the prolonged quarantine measures at the country level, including the strict lockdown, have seriously affected the national economy and business operations. The Asian Development Bank (ADB 2020a) estimated that economic growth in developing Asia would drop sharply from 5.1% in 2019 to –0.4% in 2020, impacted by the pandemic. Given the new coronavirus variant found globally in 2021, the economic damage will increase further nationally, regionally, and globally due to the increased uncertainty of containing COVID-19.

Many Asian countries implemented COVID-19 containment measures relatively soon after the pandemic was identified, which included travel bans, temporary closures of schools and businesses, and social distancing. During the pandemic, private businesses have cut back production and service delivery and have faced a lack of working capital, making it difficult to continue operations for most of them, especially micro, small, and medium-sized enterprises (MSMEs) due to supply chain disruptions and tightened financial conditions (ADB 2020b).

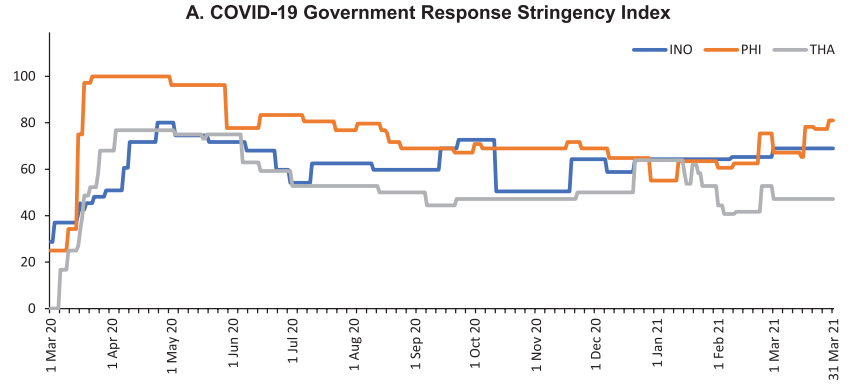
Country's quarantine measures have strictly limited people's mobility. Comparing the "stringency index" developed by the University of Oxford as a tool to measure national containment policies (Figure 1A) with Google's "extent of mobility" measure (Figure 1B), the more stringent policies have accelerated the decline in mobility outside the home. For instance, the Philippines moved to the strictest lockdown or enhanced community quarantine (ECQ) in the national capital region and high-risk provinces from mid-March to end May 2020. It contributed to the sharp decline in people's mobility during that period, resulting in the sharp drop in sales and revenue of businesses.

People's lives and work styles have been dramatically changed after the pandemic started, forcing them to fit contactless societies under the "new normal" or post-COVID-19. Traditional business models that require physical and personal contacts have been shifted to digital transactions, following this trend. Digital transformation would be an inevitable action for MSMEs to survive, given the potential third and fourth waves of the pandemic.

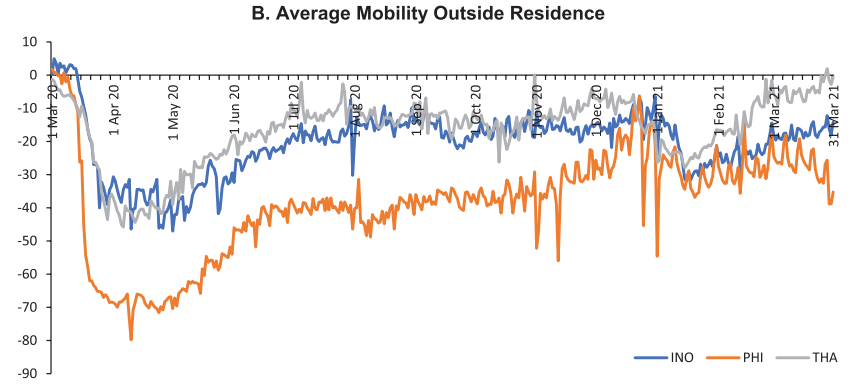
This article reviews the level of digital penetration of MSMEs during the COVID-19 pandemic and examines the COVID-19 impact on digitally operated MSMEs, using evidence obtained from ADB's MSME surveys conducted in March–April 2020, August–September 2020, and March–April 2021 in Indonesia, the Philippines, and Thailand. It is followed by the discussion on the role of the fintech industry and the policy implications for digital transformation of MSMEs.

Digital penetration of MSMEs

ADB's MSME surveys in March–April 2020 received a total of 3,476 complete responses from MSMEs in Indonesia (525), the Philippines (1,804), and Thailand (1,147). The follow-up surveys in August–September 2020 received a total of 1,334 complete responses from MSMEs in Indonesia (128), the Philippines (686), and Thailand (520). The follow-up surveys in March–April 2021 received a total of 2,281 complete responses from MSMEs in Indonesia (278), the Philippines (1,504), and Thailand (499) as of the end of March



INO = Indonesia, PHI = Philippines, THA = Thailand.
Note: The Government Response Stringency index is a composite measure of nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100, with 100 being the strictest response.



INO = Indonesia, PHI = Philippines, THA = Thailand.
Note: The baseline is the median value from the 5-week period 3 January–6 February 2020.

Sources: For Figure 1A, University of Oxford. Our World in Data. https://ourworldindata.org/grapher/covid-stringency-index. Accessed: 15 April 2021. For Figure 1B, Google. Community Mobility Reports. https://www.google.com/covid19/mobility/. Accessed: 15 April 2021.

Figure 1: Stringency of containment policies

2021 (this survey is ongoing when I wrote this article). The surveys were done online in cooperation with the Ministry of Cooperatives and SMEs and KADIN (Kamar Dagang dan Industri) for Indonesia; the Bureau of Small and Medium Enterprise Development of the Department of Trade and Industry, the Chamber of Commerce and Industry, and the Bankers Association for the Philippines; and the Office of Small and Medium Enterprise Promotion, the Thai Credit Guarantee Corporation, and the Thai Chamber of Commerce for Thailand. From these surveys, MSMEs that use Internet in daily business or are engaged in online selling or e-commerce were extracted to see the level of digital penetration of MSMEs throughout a year of the pandemic.

Relatively high proportion of MSMEs surveyed used Internet for business in the beginning of the pandemic (March 2020): 95.6% for MSMEs in Thailand, 74.0% in the Philippines, and 71.4% in Indonesia (Figure 2A). In August 2020, 62.9% of MSMEs were engaged in online selling of their products or e-commerce in Thailand, followed by 59.4% in Indonesia and 45.6% in the Philippines. However, as of the end of March 2021, this share was down to 58.5% in Thailand and 34.9% in the Philippines while it increased to 63.3% in Indonesia.

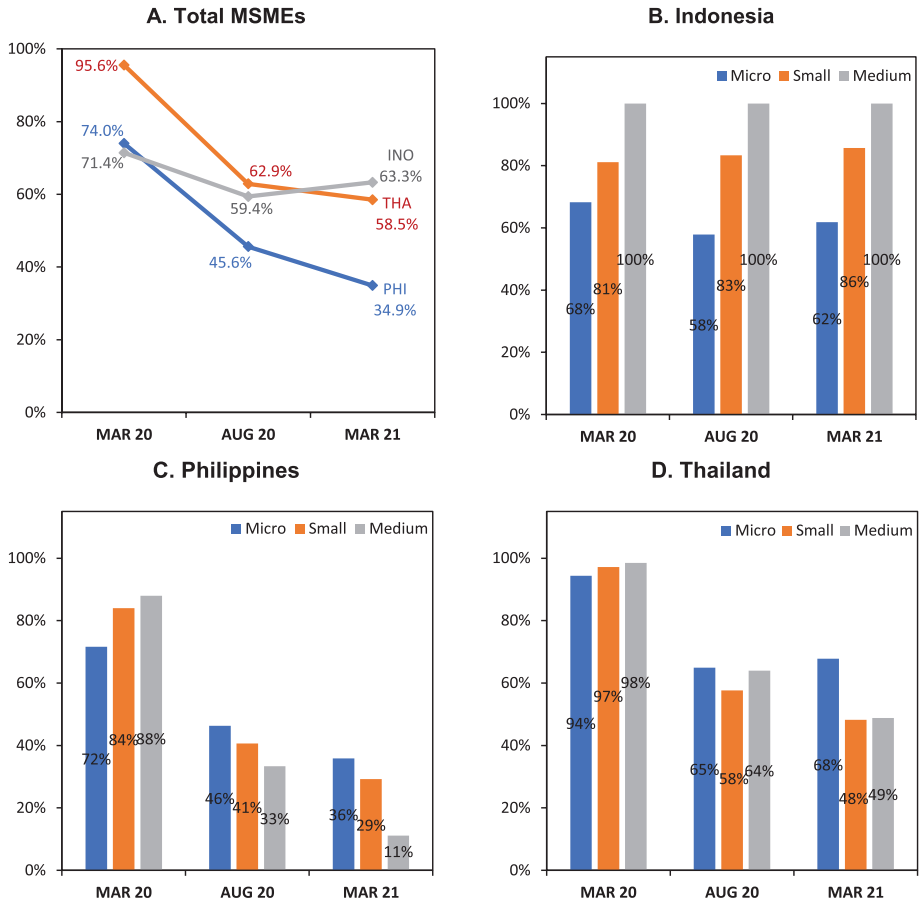
For the Philippines and Thailand, people's mobility was improved in March 2021 compared with August 2020 (Figure 1B), suggesting that businesses are somewhat back to normal with less digital transactions in these countries. Meanwhile, for Indonesia, the stringency of containment policies has increased between August 2020 and March 2021 and people's mobility has been further restricted, suggesting that the demand on digital transactions has increased for businesses.[1]

The larger the firm size is, the higher their digital penetration for business in the beginning of the pandemic (Figures 2B–D), but the level of MSMEs' digital transformation is likely to correspond to the level of policy stringency and people's mobility. For Indonesia, micro and small enterprises engaged in online selling or e-commerce increased from August 2020 to March 2021, following the strengthened containment policies and the dull mobility of people (Figure 2B). For the Philippines, the share of firms engaged in e-commerce to the total tended to decrease during the same period regardless of firm size, but more pronounced in medium-sized enterprises, suggesting that larger firms move back to less-digitalized normal business as the containment policies ease (Figure 2C). However, it should be noted that the Philippines has returned to the ECQ since 29 March 2021, signaling another decline in people's mobility and potential increase of MSMEs' demand on digital transactions. Thailand had a mixed result. The share of microenterprises with e-commerce to the total microenterprises increased slightly from August 2020 to March 2021, while that of small and medium-sized enterprises with e-commerce decreased during the same period, following the improved mobility of people (Figure 2D).

COVID-19 impact on digitally operated MSMEs

This section compares the impact of COVID-19 between digitally operated MSMEs (those using Internet in daily business or

[1] The monthly average score of mobility outside residence was calculated based on Google's Community Mobility Reports. It indicated –14.4 in August 2020 and –17.3 in March 2021 for Indonesia; –41.5 in August 2020 and –27.3 in March 2021 for the Philippines; and –12.6 in August 2020 and –4.6 in March 2021 for Thailand.



INO = Indonesia, PHI = the Philippines, THA = Thailand.
Note: Valid samples: For Indonesia, 525 for March 2020 (MAR 20), 128 for August 2020 (AUG 20), and 278 for March 2021 (MAR 21); For the Philippines, 1,804 for MAR 20, 686 for AUG 20, and 1,504 for MAR 21; For Thailand, 1,147 for MAR 20, 520 for AUG 20, and 499 for MAR 21.

Source: Author's calculation based on MSME surveys in March–April 2020, August–September 2020, and March–April 2021 (end-March data).

Figure 2: Digital penetration of MSMEs during the COVID-19 pandemic

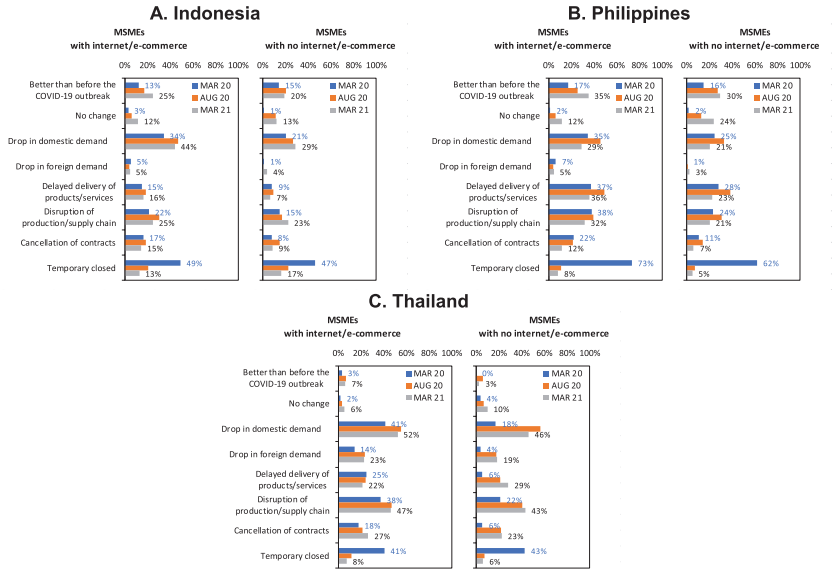
engaged in online selling or e-commerce) and traditional MSMEs (those neither using Internet for business nor engaged in e-commerce) at three points in time (March 2020, August 2020, and March 2021) in Indonesia, the Philippines, and Thailand. By sector, digitally operated MSMEs mainly comprise manufacturing, accommodations and food services, wholesale and retail trade, agriculture products, information and communication technology (ICT), and other services. Traditional MSMEs also comprise the same components.

Business environment

Both digitally operated and traditional MSMEs have traced the severe trend in business environment during the COVID-19 pandemic, but the magnitude of the impact was high in the former (Figure 3). Both types of MSMEs were largely forced to close their business relatively soon after the pandemic was identified in March 2020, but the share of temporarily closed firms to the total was sharply reduced 1 year after the pandemic began in three observed countries. Firms have started reopening since August 2020, but their business environment has remained severe, especially for digitally operated MSMEs.

In Indonesia, 44% of digitally operated MSMEs reported a drop in domestic demand in March 2021, higher than traditional MSMEs that reported the same (29%) (Figure 3A). In the Philippines, the delayed product delivery (36%), supply disruptions (32%), and a drop in domestic demand (29%) hit digitally operated MSMEs more seriously than traditional MSMEs in March 2021, although these conditions were improved from August 2020 (Figure 3B). In Thailand, similarly, 52% and 47% of digitally operated MSMEs faced a drop in domestic demand and supply disruptions, respectively, in March 2021, slightly higher than traditional MSMEs reporting the same (Figure 3C).

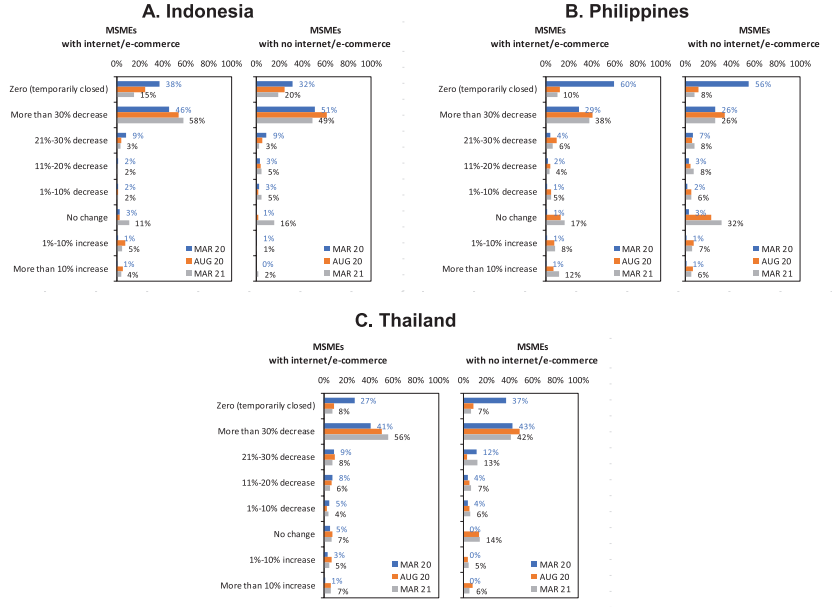
The pandemic and national quarantine measures (lockdown) created two business groups: (i) contracting firms hurt badly by the pandemic and quarantine measures (lockdown) and (ii) firm groups that benefitted from quarantine measures (Shinozaki and Rao 2021). In comparison, clearer differentiation was identified in digitally operated MSMEs than traditional MSMEs. The share of digitally



Note: Valid samples: For Indonesia, 525 for March 2020 (MAR 20), 128 for August 2020 (AUG 20), and 278 for March 2021 (MAR 21); For the Philippines, 1,804 for MAR 20, 686 for AUG 20, and 1,504 for MAR 21; For Thailand, 1,147 for MAR 20, 520 for AUG 20, and 499 for MAR 21.

Source: Author's calculation based on MSME surveys in March–April 2020, August–September 2020, and March–April 2021 (end-March data).

Figure 3: Business environment during the COVID-19 pandemic



Note: Valid samples: For Indonesia, 525 for March 2020 (MAR 20), 128 for August 2020 (AUG 20), and 278 for March 2021 (MAR 21); For the Philippines, 1,804 for MAR 20, 686 for AUG 20, and 1,504 for MAR 21; For Thailand, 1,147 for MAR 20, 520 for AUG 20, and 499 for MAR 21.

Source: Author's calculation based on MSME surveys in March–April 2020, August–September 2020, and March–April 2021 (end-March data).

Figure 4: Revenue during the COVID-19 pandemic

operated MSMEs that reported better business environment than before the COVID-19 outbreak increased from 13% in March 2020 to 25% in March 2021 in Indonesia, 17% to 35% in the Philippines, and 3% to 7% in Thailand (Figure 3). These figures were higher than those in traditional MSMEs. Although firm groups benefitted from quarantine measures were still small fraction, digitally operated MSMEs were likely to have a better position to survive and grow during the pandemic.

Revenue

The share of MSMEs with no revenue has decreased sharply 1 year after the pandemic began in March 2020 as they start reopening. However, they have continued a sharp drop in revenue, especially for digitally operated MSMEs. In Indonesia, 58% of digitally operated MSMEs faced more than 30% revenue drop in March 2021, a 12 percentage points higher than in March 2020 (Figure 4A). In the Philippines, 38% of them decreased revenue by more than 30% in March 2021, a 9 percentage points higher than in March 2020 (Figure 4B). In Thailand, 56% of them reported more than 30% revenue drop in March 2021, a 15 percentage points higher than in March 2020 (Figure 4C). The larger share of traditional MSMEs also faced a sharp drop of revenue by more than 30% in March 2021, but the share was below or the same level as in March 2020, and it was lower than the share in digitally operated MSMEs (49% in Indonesia, 26% in the Philippines, and 42% in Thailand in March 2021) (Figure 4).

The compressed demand and supply disruptions continuously affected MSMEs' income, more seriously in digitally operated MSMEs. Meanwhile, some digitally operated MSMEs increased their revenue during the pandemic, especially food manufacturing and processed food and beverage trading. In Indonesia, the share of digitally operated MSMEs that reported a revenue increase expanded from 2% in March 2020 to 9% in March 2021 (Figure 4A). It increased from 2% to 20% in the same period in the Philippines (Figure 4B) and 4% to 12% in Thailand (Figure 4C).

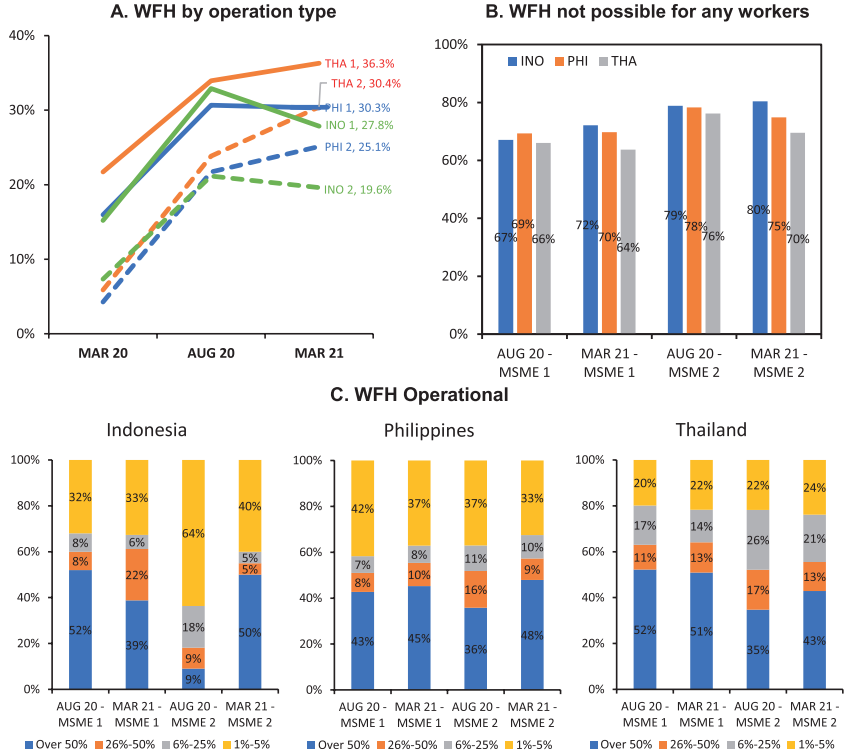
Employment

The national quarantine measures, especially lockdown measures, require people to stay at home and avoid moving outside from the residence for nonessential purposes. To contain the spread of COVID-19, governments encourage firms to shift their business models from traditional operations based on personal contact to more contactless operations, including work-from-home (WFH) or teleworking.

In the beginning of the pandemic in March 2020, only small portion of MSMEs adopted WFH or teleworking, mainly in digitally operated MSMEs (Figure 5A). In Indonesia, 15.2% of digitally operated MSMEs started WFH in March 2020 while only 7.3% of traditional MSMEs did so especially for family-run or home businesses that are able to complete the production process at home. In the Philippines, 16.0% of digitally operated MSMEs moved to WFH in March 2020 while only 4.3% of traditional MSMEs did so. In Thailand, 21.7% of digitally operated MSMEs adopted WFH in March 2020 while 5.9% of traditional MSMEs did so. It should be noted that a large number of MSMEs suspended their business at that time.

One year after the pandemic, as MSMEs start reopening, the WFH arrangement has spread in both digitally operated and traditional MSMEs, but still mainly in digitally operated MSMEs backed by their familiarity with ICT tools (Figure 5A). In Indonesia, 27.8% of digitally operated MSMEs adopted WFH in March 2021 while 19.6% of traditional MSMEs did so; both sharply increased from March 2020 but decreased from August 2020. In the Philippines, 30.3% of digitally operated MSMEs introduced WFH in March 2021 while 25.1% of traditional MSMEs did so. In Thailand, 36.3% of digitally operated MSMEs adopted WFH in March 2021 while 30.4% of traditional MSMEs did so; both recorded a high increase as well.

WFH or teleworking tends to be a major work style for most businesses under the "new normal" that promotes contactless societies. However, ADB surveys reveal that the majority of MSMEs in observed countries (64%–80%) have reported WFH as not a possible option for any workers throughout 1 year after the pandemic started, although the share of MSMEs reporting this condition tends to decrease (Figure 5B). This trend was more evident in traditional MSMEs. There were several reasons behind this: e.g., a lack of ICT infrastructure, high cost for Internet connection, and teleworking not fit to the nature of business such as home businesses.



INO = Indonesia, PHI = the Philippines, THA = Thailand, WFH = work-from-home.
Notes: Valid samples: For Indonesia, 525 for March 2020 (MAR 20), 128 for August 2020 (AUG 20), and 278 for March 2021 (MAR 21); For the Philippines, 1,804 for MAR 20, 686 for AUG 20, and 1,504 for MAR 21; For Thailand, 1,147 for MAR 20, 520 for AUG 20, and 499 for MAR 21. For Figure 5A, INO1, PHI1, and THA1 for MSMEs with internet/e-commerce, while INO2, PHI2, and THA2 for MSMEs with no internet/e-commerce. For Figures 5B and 5C, MSME 1 = MSMEs with e-commerce; MSME 2 = MSMEs with no e-commerce.

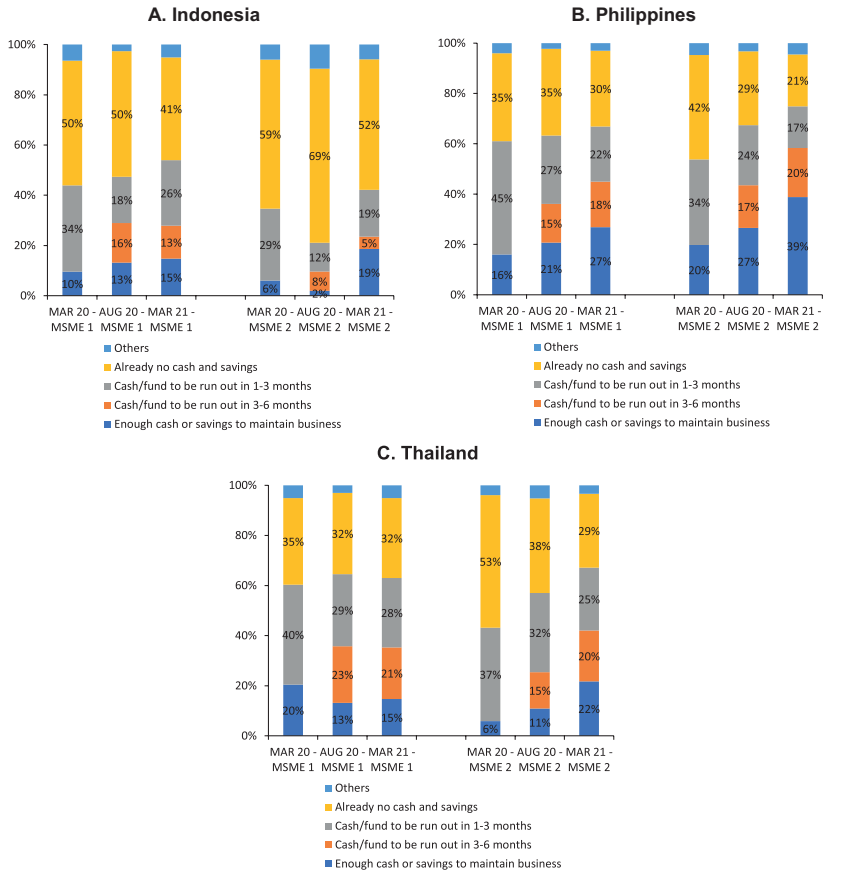
Source: Author's calculation based on MSME surveys in March–April 2020, August–September 2020, and March–April 2021 (end-March data).

Figure 5: Work-from-home (WFH) arrangement

When looking at MSMEs that adopted WFH, the share of firm's workers who conducted WFH without major disruption in operations differed by country (Figure 5C). In Indonesia, 52% of digitally operated MSMEs that introduced WFH reported that more than 50% of workers could work from home in August 2020. However, it decreased to 39% in March 2021; instead those reporting that 26%–50% of workers could do so increased in the same period (from 8% to 22%). The share of traditional MSMEs that commenced WFH by more than 50% of workers increased from 9% in August 2020 to 50% in March 2021. In the Philippines and Thailand, 45% and 51% of digitally operated MSMEs with WFH reported over 50% of workers in WFH in March 2021 while 48% and 43% of traditional MSMEs with WFH reported the same condition, respectively. Similar to Indonesia, traditional MSMEs with WFH by more than 50% of workers increased in March 2021 in the Philippines and Thailand.

Financial condition

In the beginning of the pandemic, MSMEs faced serious cash flow problems in observed countries, but it has been gradually eased. In Indonesia, 50% of digitally operated MSMEs had already no cash and savings in March 2020, but it was improved to 41% in March 2021; instead those with enough cash or savings to maintain business increased from 10% in March 2020 to 15% in March 2021, although it is still small share (Figure 6A). Meanwhile, more than half of traditional MSMEs have been indulged in already no cash and savings throughout a year of the pandemic in Indonesia; but those with enough cash or savings for continued operations also increased from 6% in March 2020 to 19% in March 2021.



Notes: Valid samples: For Indonesia, 525 for March 2020 (MAR 20), 128 for August 2020 (AUG 20), and 278 for March 2021 (MAR 21); For the Philippines, 1,804 for MAR 20, 686 for AUG 20, and 1,504 for MAR 21; For Thailand, 1,147 for MAR 20, 520 for AUG 20, and 499 for MAR 21. MSME 1 = MSMEs with internet/e-commerce; MSME 2 = MSMEs with no internet/e-commerce.

Source: Author's calculation based on MSME surveys in March–April 2020, August–September 2020, and March–April 2021 (end-March data).

Figure 6: Financial condition

In the Philippines, the share of digitally operated MSMEs with already no cash and savings slightly decreased from 35% in March 2020 to 30% in March 2021, while those with enough cash and savings increased from 16% to 27% during the same period (Figure 6B). However, financial conditions in traditional MSMEs rather improved than those in digitally operated MSMEs in the Philippines: those with already no cash and savings decreased from 42% to 21% while those with enough cash and savings increased from 20% to 39% during the same period. Thailand traced the similar trend with the Philippines. Traditional MSMEs in Thailand with no cash and savings decreased from 53% to 29% while those with enough cash and savings increased from 6% to 22% during the same period (Figure 6C).

This suggests that financial conditions of traditional MSMEs have improved rather than those of digitally operated MSMEs in the Philippines and Thailand as they move back to normal business following eased containment policies and improved mobility. Traditional MSMEs in Indonesia have continuously faced a serious lack of working capital throughout a year of the pandemic, backed by stringent containment policies and limited mobility. The share of traditional MSMEs that reported already no cash and cash to be run out in 1–3 months at the time of the survey reached 71% of total traditional MSMEs in Indonesia in March 2021.

Role of the Fintech industry

Despite the fact that MSMEs are facing a serious lack of working capital, they have not changed their conventional funding approach even during the COVID-19 crisis, that is, highly relying on their own funds and borrowing from family, relatives, and friends to survive during the pandemic in observed countries (Figure 7). Getting credit from banks was limited for most MSMEs but has gradually improved backed by government emergency lending support measures such as refinancing facilities, soft loan programs, and special credit guarantees. Throughout a year of the pandemic, however, the share of MSMEs that utilize digital finance platforms (e.g., peer-to-peer lending and crowdfunding) for working capital was very low in all countries observed. Even digitally operated MSMEs had not so utilized digital finance platforms for funding, ranging between 0.6% and 3.1% of them (Figure 7).

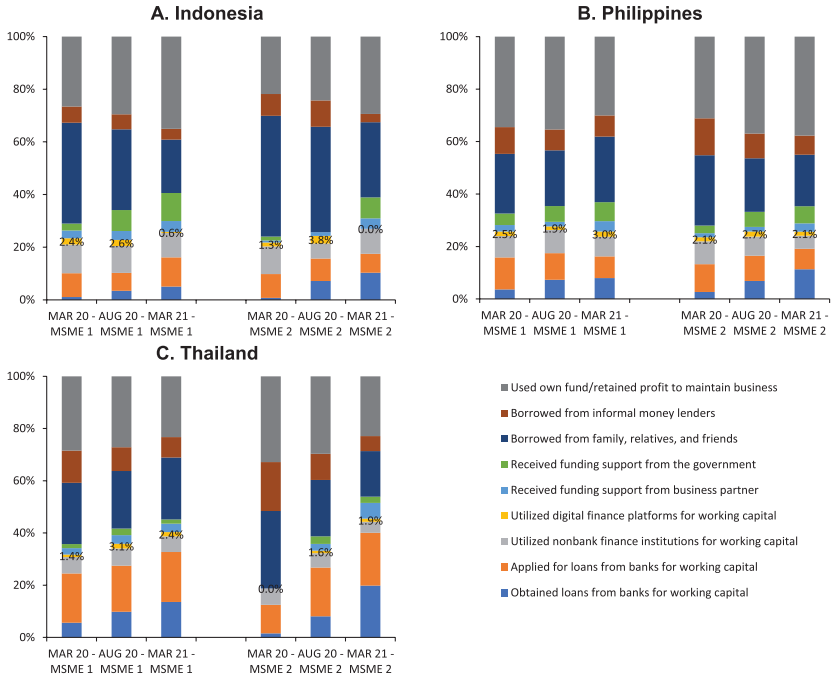
The COVID-19 crisis promoted a shift in MSME business models from conventional ways that require personal contact to contactless digital transactions. However, ADB surveys indicate that digital transformation of MSME business is likely to correspond to the level of stringency of containment policies and people's mobility, suggesting that MSMEs' digital transformation has yet to be established stably in observed countries. It is clearer that digital finance services have yet to be a major financing source for MSMEs.

Breakthroughs in financial technology (fintech) can help MSMEs to access low cost and faster financing; hence, it will contribute to improving their lack of working capital and surviving their business during the COVID-19 crisis. In 2019, ADB examined the fintech loan program for Filipino tricycle drivers (self-employed workers) that was offered by Japan's fintech solution provider Global Mobility Services (ADB 2020c). The tricycle is a three-wheeled vehicle popularly utilized by people in the Philippines for short distances. This ADB study assessed the impact of new financing scheme on a driver's well-being. The new loan program uses Internet of Things (IoT) to reduce moral hazard and to enforce loan repayment. It uses a remote control IoT device that can safely deactivate the motorcycle engine should the driver fail to repay on time, giving a clear incentive to repay the loan on schedule. The findings from this

study indicated that fintech loans stimulate drivers' work habits with more workdays per week, higher overall income, and improved money management with financial goals. Tricycle drivers with fintech loans are more disciplined financially and behaviorally than conventional drivers without fintech loans. The similar fintech effect is expected to traditional MSMEs as well as those already digitally operated.

Policy actions desired by MSMEs

ADB surveys also asked MSMEs for their desired policy measures to survive during the pandemic. Figure 8 extracted responses to policy options related to promoting MSMEs' digital transformation and access to digital finance services. In Indonesia, the top-ranked policy action desired by MSMEs was the "improvement of public ICT infrastructure and regulation to increase Internet speed and lower Internet cost" (82% of digitally operated MSMEs and 70% of traditional MSMEs in March 2021), followed by "financial assistance on teleworking arrangement" (72% and 63%, respectively), "streamlining government transaction processes and shift to digital platforms" (60% and 43%), and "facilitating access to new financing models or digital finance services" (50% and 49%), based on the answer "strong want" from 5 criteria (Figure 8A). In the Philippines, the top-ranked policy action desired by MSMEs was also the improvement of ICT infrastructure and relevant regulation (64% of digitally operated MSMEs and 48% of traditional MSMEs in March 2021), followed by streamlining government transaction processes and shift to digital platforms (58% and 48%, respectively), facilitating access to new financing models (54% and 42%), and teleworking assistance (50% and 37%) (Figure 8B). In Thailand, the top-ranked policy action desired by MSMEs was the facilitation of access to new financing models (63% of digitally operated MSMEs and 54% of traditional MSMEs in March 2021), followed by the improvement of ICT infrastructure and relevant regulation (46% and 35%,



Notes: Valid samples: For Indonesia, 525 for March 2020 (MAR 20), 128 for August 2020 (AUG 20), and 278 for March 2021 (MAR 21); For the Philippines, 1,804 for MAR 20, 686 for AUG 20, and 1,504 for MAR 21; For Thailand, 1,147 for MAR 20, 520 for AUG 20, and 499 for MAR 21. MSME 1 = MSMEs with internet/e-commerce; MSME 2 = MSMEs with no internet/e-commerce.

Source: Author's calculation based on MSME surveys in March–April 2020, August–September 2020, and March–April 2021 (end-March data)

Figure 7: Funding condition

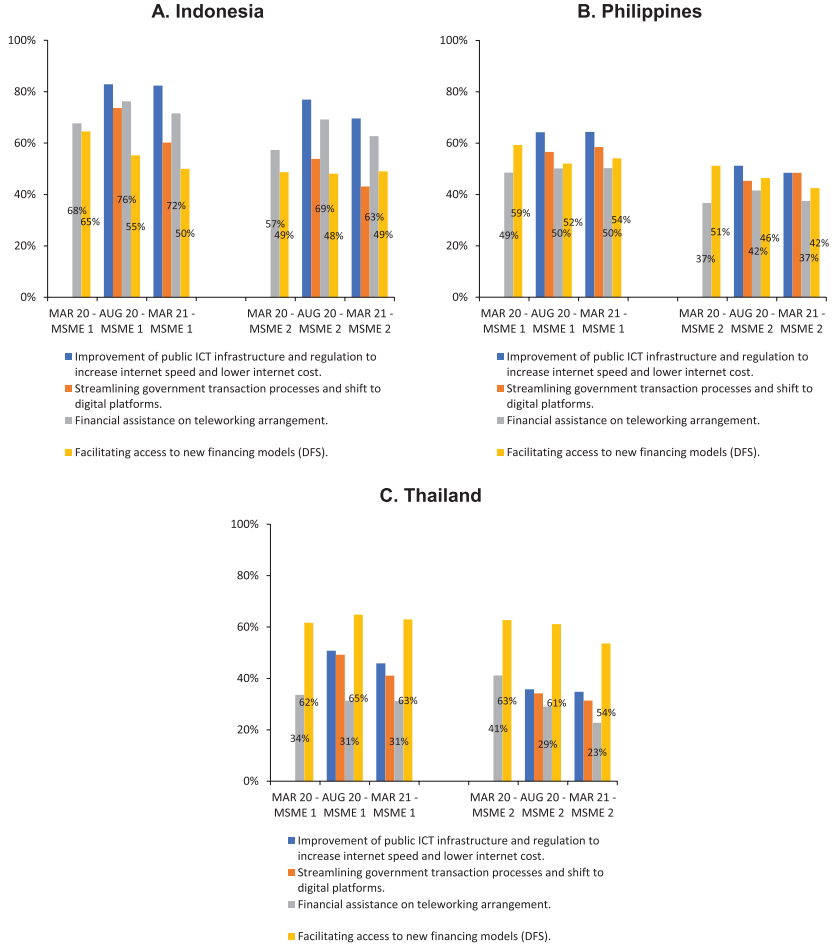
respectively), streamlining government transaction processes and shift to digital platforms (41% and 31%), and teleworking assistance (31% and 23%) (Figure 8C).

Digitally operated MSMEs have stronger needs on ICT infrastructure improvement, facilitation of digital platforms for business and finance, and financial assistance on teleworking from the government than traditional MSMEs in all observed countries with different priority, but the demand from traditional MSMEs for ICT-related support from the government was not negligible. This suggests that MSMEs have a strong perception on shifting their business from analog to digital ways under the new normal requiring contactless societies. To this end, they need more government support, while governments should pay more attention to MSMEs' priorities for digital transformation in designing assistance programs.

Conclusion

The COVID-19 crisis has brought about forced changes of people's lives and work styles as fit to contactless societies under the "new normal." Digital transformation would be an inevitable action for MSMEs to survive, given the prolonged settlement of the pandemic. The COVID-19 pandemic triggered accelerating MSMEs' digital transformation, but it is likely to correspond to the level of containment policy stringency and people's mobility. This suggests that digital transformation has yet to be established stably among MSMEs in observed countries.

Throughout a year of the pandemic, the compressed demand and supply disruptions continuously affected MSMEs' revenue, more seriously in digitally operated MSMEs. Meanwhile, some digitally operated MSMEs increased their revenue during the pandemic, especially sectors for selling essential goods and services such as food processing and delivery. The pandemic and national quarantine measures created two business groups of contracting firms and firms benefitted from quarantine measures, where clearer



DFS = digital financial services (e.g., crowdfunding, peer-to-peer lending, and other digital financial services); ICT = information and communication technology.
Notes: Based on the answer "strong want" from 5 criteria: (strongly want; somewhat want; neutral; somewhat don't want; least want). Valid samples: For Indonesia, 525 for March 2020 (MAR 20), 128 for August 2020 (AUG 20), and 278 for March 2021 (MAR 21); For the Philippines, 1,804 for MAR 20, 686 for AUG 20, and 1,504 for MAR 21; For Thailand, 1,147 for MAR 20, 520 for AUG 20, and 499 for MAR 21. MSME 1 = MSMEs with internet/e-commerce; MSME 2 = MSMEs with no internet/e-commerce.

Source: Author's calculation based on MSME surveys in March–April 2020, August–September 2020, and March–April 2021 (end-March data).

Figure 8: Policy actions desired by MSMEs

differentiation was identified in digitally operated MSMEs than traditional MSMEs, although benefitted firm groups were still small fraction.

The national quarantine measures, especially lockdown measures, require people to stay at home and avoid moving outside from the residence for nonessential purposes, promoting WFH or teleworking for businesses. In the beginning of the pandemic, only small portion of MSMEs adopted WFH, but 1 year after the pandemic started, the WFH arrangement has spread in both digitally operated and traditional MSMEs as they start reopening, but mainly in digitally operated MSMEs. However, there is the fact that the majority of MSMEs still have faced the difficulty in adopting WFH, especially for traditional MSMEs. For MSMEs that adopted WFH, the level of firm's workers who conducted WFH without major disruption in operations differed by country.

In the beginning of the pandemic, MSMEs faced serious cash flow problems in observed countries, but it has been gradually eased. But financial conditions have rather improved in traditional MSMEs than digitally operated MSMEs in the Philippines and Thailand as they move back to normal business following eased containment policies and improved mobility. Meanwhile, traditional MSMEs in Indonesia have continuously faced a serious lack of working capital throughout a year of the pandemic, backed by stringent containment policies and limited mobility.

Although MSMEs are facing a serious lack of working capital, they have not changed their conventional funding approach even during the COVID-19 crisis, i.e., highly relying on their own funds and borrowing from close relatives to survive during the pandemic. For digital finance space, little MSMEs have utilized digital finance platforms such as peer-to-peer lending and crowdfunding for working capital. Even digitally operated MSMEs had not so utilized digital finance for funding during the pandemic. Digital finance services have yet to be a major financing source for MSMEs. Breakthroughs in fintech can help MSMEs to access low cost and faster financing and hence will improve their lack of working capital and enable them to survive during the pandemic. This area should be strengthened further.

MSMEs need government assistance for improving ICT infrastructure, facilitating digital platforms for business and finance, and financing cost for teleworking, with stronger needs from digitally operated MSMEs. MSMEs have an intention to changing their business from analog to digital ways under the new normal, seeking more tangible government support.

In 2021, new coronavirus variants have been found globally. It has increased the uncertainty of containing COVID-19 and requires the governments for further elaborating a phased approach with fiscal sustainability, where policy actions for MSMEs' digital transformation should more address their priorities to stably establish the base of MSME digitalization.

References

- ✓ Asian Development Bank (ADB). 2020a. Asian Development Outlook 2020 Supplement (December 2020). Manila: ADB.
- ✓ ———. 2020b. *Asia Small and Medium-Sized Enterprise Monitor 2020 Volume II: COVID-19 Impact on Micro, Small, and*

Medium-Sized Enterprises in Developing Asia. Manila: ADB.

✓ ———. 2020c. *Asia Small and Medium-Sized Enterprise Monitor 2020 Volume III: Thematic Chapter: Fintech Loans to Tricycle Drivers in the Philippines*. Manila: ADB.

✓ Google. 2021. Community Mobility Reports. https://www.google.com/covid19/mobility/. Accessed: 15 April 2021.

✓ Shinozaki, S and L.N. Rao. 2021. "COVID-19 Impact on Micro, Small, and Medium-Sized Enterprises under the Lockdown: Evidence from a Rapid Survey in the Philippines." ADBI Working Paper Series. No. 1216.

✓ University of Oxford. 2021. Our World in Data. https://ourworldindata.org/grapher/covid-stringency-index. Accessed: 15 April 2021.

WHO COVID-19 Technology Access Pool

In May 2020, WHO and partners launched the COVID-19 Technology Access Pool (C-TAP) to facilitate timely, equitable and affordable access of COVID-19 health products by boosting their supply. C-TAP provides a global one-stop shop for developers of COVID-19 therapeutics, diagnostics, vaccines and other health products to share their intellectual property, knowledge, and data, with quality-assured manufacturers through public health-driven voluntary, non-exclusive and transparent licenses.

By sharing intellectual property and know-how through the pooling and these voluntary agreements, developers of COVID-19 health products can facilitate scale up production through multiple manufacturers that currently have untapped capacity to scale up production.

C-TAP was launched by WHO, in partnership with the Government of Costa Rica, under a global Solidarity Call to Action endorsed by nearly 40 Member States. WHO C-TAP implementing partners include the Medicines Patent Pool, Open COVID Pledge, UN Technology Bank and Unitaid. Developers of COVID-19 health technologies and holders of related knowledge, intellectual property and data are invited to "share their intellectual property, knowledge and data, and join the Solidarity Call to Action."

The COVID-19 Technology Access Pool (C-TAP) provides a platform for developers of COVID-19 therapeutics, diagnostics, vaccines and other health products to voluntarily share their intellectual property, knowledge, and data, with multiple quality-assured manufacturers. This enables manufacturers that currently have untapped capacity to produce COVID-19 health products by giving them the legal rights to manufacture and sell the products; the technological know-how required to develop high-quality products effectively and efficiently; and access to clinical data needed to obtain regulatory approval for their products

C-TAP works through its implementing partners, the Medicines Patent Pool, Open COVID Pledge, UN Technology Bank and Unitaid to facilitate timely, equitable and affordable access to COVID-19 health technologies. Developers of COVID-19 health technologies and holders of related knowledge, intellectual property and/or data are invited to voluntarily share with C-TAP by joining the Solidarity Call to Action.

For more information, access:

https://www.who.int/initiatives/covid-19-technology-access-pool/

Digital Solution for the Society and Government in Covid-19 Combat and Economic Recovery

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Abstract

The social demands for contactless living and economic activities during coronavirus disease 2019 (Covid-19) have accelerated China's digitalization development. A boom of digital applications in healthcare, education, retail, logistics etc. has largely engaged new users to adapt to a new lifestyle. At the same time, the Chinese government has also taken targeted policy measures to address the concerns about personal data protection and emerging digital divide. This article covers some of the digital solutions applied in Covid-19 combat and economic recovery which will also have profound impacts on China's social and economic development in the long term.

Introduction

As coronavirus disease 2019 (Covid-19) has largely impacted people's daily life, especially during lockdowns and social distancing, the social demands in contactless living and economic activities have become the fundamental driving force to accelerate digitalization in China. The Covid-19 combat and economic recovery process has witnessed a boom of digital applications on different fronts: online medical care, online education, online retail, logistics and contactless delivery, telecommuting, etc. The number of new users in these fields has grown rapidly, and these digital applications have become a new engine to promote China's economic and social development. Meanwhile, concerns on personal data protection and digital divides have emerged. Targeted policy measures have been taken to mitigate the potential risks brought by the use of digital technologies in pandemic combat and economic recovery.

Boom of the contactless society and economy

Online medical care

As hospitals were overburdened with coronavirus cases in the early stage of the pandemic, sometimes there were few resources to help those with chronic diseases in need of urgent treatment. This situation pushed more users to turn and adapt to online healthcare. Internet hospitals provide services like online consultation, appointments, diagnosis and treatment networks, and family doctors. To address people's needs and facilitate the use of online medical care, the Chinese government relaxed the market access restrictions for Internet hospitals. Besides, the "Internet+" medical follow-up and pharmaceutical services allow the patients with common and chronic diseases to pay through medical insurance, making it more convenient and inclusive. Thanks to these policies, both traditional medical institutions and new Internet hospitals have actively developed online medical services to alleviate the problem. According to the Department of the Planning and Information from the National Health Commission (NHC), at the peak of the pandemic, the online diagnosis and treatment in hospitals under the NHC administration increased by 17 times compared with the same period last year, and online diagnosis and treatment consultation through third-party platforms increased by more than 20 times, with the number of prescriptions increasing by nearly 10 times (People.cn, 2020).

Apart from the government, e-commerce enterprises such as Alibaba, JD.com, Tencent, and ByteDance also take an active part in online medical care with their strong user base and technology advantage. For example, Aliyun, a business of Alibaba Group, provides support in medical Artificial intelligence and informatization, such as introducing deep learning into intelligent medical diagnosis and data analysis. Alibaba has also launched online clinic service for online consultations and drug delivery service for those with chronic diseases. As shown in Figure 1, Alibaba's collaboration the food delivery company Ele.me enables 24-hour drug delivery service across major parts of Beijing with only 30-minute delivery time in the day and 1 hour at night. Alibaba's pilot in Jinan City achieves the whole service chain of "Internet consultation + online prescription circulation + online medical insurance payment + drug delivery" (Cao, 2020).

Online education

Online education is a kind of learning behavior based on the Internet while

Figure 1: 24-hour drug delivery service map in Beijing with 30-minute delivery time[1]

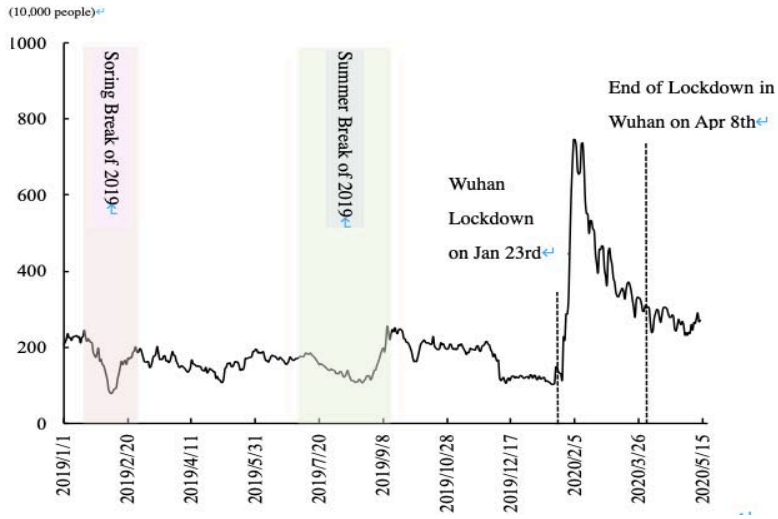

Figure 2: Number of new users of online education apps[2]

teaching activities take place through the Internet applications. As shown in Figure 2, the number of new users of online education applications in China has seen a sharp growth at the beginning of the pandemic. After February 2020, although the number of new users has gradually declined, it basically stabilizes at about 1.7 times of that before the pandemic (Dai, 2021).

As the Chinese government introduced the "suspend offline classes but continue learning online" policy, almost all educational institutions, including public schools, after-school tutoring centers, and vocational training institutions have switched to online learning. The "learning from home" trend has made online education a hot spot. The online courses are mainly conducted with recorded videos and live broadcasting videos. The application of 5G technology significantly improves the speed and stability of the network, creating immersive teaching and learning experience during live streaming and facilitating effective interactions between teachers and students. The combination of 5G technology with Virtual reality, Augmented Reality, and holographic projection could further improve the experience with live courses and accelerate the development of China's online education market (Chen, 2021).

Online retail

The recent years have seen China's rise as a global leader in e-commerce. The pandemic has further transformed the online retail industry and made online shopping not just a trend, but a major way of consumption. The high penetration rate of the Internet and the popularity of different kinds of terminals (smartphones, tablets, netbooks…) enabled e-commerce enterprises to expand their customer coverage, and Covid-19 has further increased the purchase frequency of existing users and brought new users into play. To alleviate the sales decrease from Covid-19, department stores in China have turned to boost their "live-streaming sales." Intime Retail, a department store chain has cooperated with Taobao to livestream shopping guide sessions by "cloud salesclerks," and achieved "contactless shopping" via delivery (cnr.cn, 2020).

In addition, the Internet of Things and big data also empowered a better understanding of the market and customer preferences, offering stronger competitive advantages for high-tech companies. These e-commerce platforms could then provide retail companies with big data support in customer portraits to build "hot style" and increase sales. "In the past, we did our own data analysis, which was relatively broad, and the e-commerce platform gave us more accurate data," says a 3C

[1] Source: TechWeb.com.cn

[2] Note: selected 50 typical applications in education from 8 mobile application markets, and calculated the daily new downloads.

firm manager in the interview.[3] According to the National Bureau of Statistics, online retail sales in China reached 11,760.1 billion RMB in 2020, growing by 10.9% year on year.[4]

Logistics and contactless delivery

The fast development of online retail has also stimulated that of the logistics and delivery industry, which to a large extent alleviated the impact of Covid-19 on people's everyday life. China's express delivery industry has shown great resilience, vitality, and growth potential in the face of the pandemic in 2020, with the annual volume of express delivery reaching a historic 83.36 billion pieces.[5] On the other hand, Large food takeaway groups such as Meituan and Ele.me have also played an irreplaceable role, especially for those in quarantine. Not only could they deliver meals and necessities to people at home, but they have also distributed medical supplies to hospitals and patients.

The social demand for contactless delivery in the pandemic has prompted the development of smart express cabinets and drone delivery. China's largest smart locker company Hive Box operates a network of 24-hour self-service package drop-off and pick-up stations for express delivery companies and e-commerce logistics across China. It cooperated with Meituan to use its counters as delivery stations to promote contactless delivery. The intelligent delivery robots developed by JD.com could send medical supplies to the hospitals, which played an important role in Covid-19 response in Wuhan and across China.

Cainiao, the global parcel tracking platform of Alibaba Group, has ensured the transnational "lifeline" of medical supplies in response to the pandemic. Its intelligent scheduling system seamlessly connects stations around the world. And the Cainiao Green Channel for donated supplies has 19 ports around the world supported for customs clearance, with the capacity to clear 28 million parcels in a day.[6]

Telecommuting

With the help of China's rapid digitalization development and people's improved living conditions, remote working has emerged as a new work model even before Covid-19. As the pandemic hit a large number of people and companies under severe financial pressure with the threat of bankruptcies and layoffs, it also motivated people to proactively adapt to remote working.

During the pandemic, telecommuting is a common choice for government organizations and enterprises. The number of new active telecommuting users in the mobile application market rapidly increased by three times of that before the pandemic, and began to stabilize after March (Dai, 2021). For example, the number of daily active accounts of the Tencent Conference exceeded 10 million at the end of March 2020 (Dai, 2021). Since the country's work resumption after the Spring Festival in 2020, DingTalk, an intelligent working platform created by Alibaba Group has been No. 1 on Apple's App Store for several days in a row, supporting more than 200 million office workers from more than 10 million enterprises to work online (Liu, 2020). The app's features such as audio and video conferencing, task management and health self-claim clocking in enable companies to shift their business-related discussions and decision-making processes online.

With its further penetration and development, telecommuting not only addresses the need for work resumption, but also encourages users to learn new working methods and balance their work and family care. MobTech data (2020) shows that during the business resumption phase, more than 400 million Chinese users have used remote working applications, and among them, new daily users of working collaboration applications exceeded 3 million.

Reinforced by the Covid-19 outbreak, the Chinese citizens now have further developed and strengthened their habits of deeply integrating the Internet into daily life. Now, even the elderly and those in rural areas have gradually familiarized themselves with online services such as e-commerce and online medical care. For the frequent Internet users before the outbreak, their demand structures have been further renewed and created. Some traditional offline consumption scenarios are moved online or achieve better online–offline integration. A lot of restaurants and retail stores now have both online and offline operations. Through the impact of the contactless economy, Covid-19 has further boosted the country's digitalization development.

New digital responses to Covid-19

China's new applications of digital technologies are also playing a vital role in combating Covid-19. Whitelaw et al. (2020) highlighted six ways how these applications contribute to pandemic management and response: contact tracing, quarantine and self-isolation, screening for infection, clinical management, planning and tracking, and medical supplies. The paper concludes that counties with low Covid-19 mortality rates succeed in adopting these digital technologies and integrating them effectively into their policies and healthcare (Whitelaw et al., 2020). Below are some key examples of how China utilizes digitalization to combat Covid-19.

Contact tracing

Contact tracing is a key strategy to interrupt the chain of transmission of Covid-19 by

[3] Yu, C. (2021). "Visit the e-commerce "Gigafactory": Digital empowers manufacturers to get rid of price battles". https://m.21jingji.com/article/20210407/33e0e36ddf0385809e7b45f4a5d7b335.html

[4] National Bureau of Statistics. (2021). "The total retail sales of consumer goods increased by 4.6% in December 2020". http://www.stats.gov.cn/tjsj/zxfb/202101/t20210118_1812428.html

[5] ASKCI.com. "This year's express delivery volume has exceeded 20 billion pieces. What will China's express delivery volume reach in 2021?" https://new.qq.com/omn/20210325/20210325A07KV200.html

[6] Liu, S. (2020). "Application of digital technology in epidemic prevention", unpublished.

treating those tested positive and isolating those exposed to them into quarantine. It requires cooperation from different government authorities including health, telecommunications, and transportation of both local and central levels. In 2020, the total number of mobile communication base stations in China reached 9.31 million, with a net increase of 900,000 in the whole year, achieving deep coverage in urban areas.[7] In the meantime, steady progress has been made in building 5G networks. The well-established communication infrastructure and high penetration rate of mobile users make it feasible to identify the contacts. The Chinese government makes use of telecom big data to retrieve information over 14 days, checking the whereabouts of mobile phone users, especially those who visited the Covid-19-affected areas. Close contacts could also be identified by travel information from the transportation department and confirmed or suspected cases from the health department.

On the other hand, mobile users could also make use of the online big data platform to check if they have been exposed to suspected cases. They could also use the "health code" generated from the platform to prove that they are of less risk.

Quarantine and self-isolation

The "health code" is a digital health status certificate and travel pass in the form of a real-time dynamic quick response (QR) code accessible on Alipay or WeChat, two of the most commonly used apps in China. The code is automatically generated from data provided by the government-operated backend big data platform and users' self-declaration of health status and travel history. The health code has three different colors representing different risk levels: those with green codes are of low risk and permitted to travel without restrictions, and those with red codes will be reported to the pandemic control authorities and quarantined.

The health code system provides an effective way for the Chinese government to quarantine those exposed to Covid-19, while posing less strict restrictions on other citizens to reduce the socioeconomic impacts of quarantine. It also facilitates the work resumption process while still keeping the disease under control. The health code is now widely used as a travel pass in public places such as airports, train stations, shopping malls, and office buildings. In addition, the national E-Government Citizen Services Platform has unified the code systems from different local governments so that people could travel across different provinces in China using the same health code system. It not only saves time for travelers from filling out different kinds of forms to report their travel history and health conditions, but also avoids repetitive paperwork for the local governments. The digitalized system significantly improves the efficiency of information gathering for quarantine and self-isolation.

Clinic management

The medical personnel and experts make very good use of 5G network for remote consultation, data transmission, and remote surgery. In this process, the limited resources from top hospitals across the country are fully utilized to better diagnose and treat Covid-19 patients.

AI technology also contributes its part in the reception and consultation of the patients with robot doctors, effectively improving the efficiency of Covid-19 screening and diagnosis accuracy. For example, the smart outpatient pretest and triage system can quickly and accurately classify the patients according to their level of infection risk. It could then effectively avoid cross-infection among different kinds of patients, reduce the load of hospital fever outpatient service, and save medical supplies. The robots allow doctors to diagnose and treat patients remotely: the doctors would observe patients from the screen and communicate directly with patients; at the same time, with the help of big data, the diagnosis and treatment record can be reported to the database in real-time, so that the Center for Disease Control (CDC) can understand the actual situation on the front line to increase transparency and support the policy decisions.

Information disclosure

China has made full use of new media to improve the information disclosure during Covid-19. With its digitalization and Internet distribution functions and platform advantages, people have better access to practice their right to know and supervise with the facilitation of new media, and the Chinese government also manages to respond to their concerns promptly.

During the Covid-19 outbreak, China's relative authorities have used new media to release daily updates of confirmed and suspected cases, policy measures to contain the virus, and important suggestions for disease prevention in people's daily life. With its distinctive advantages of real-time sharing and large user base, new media helps disclose and disseminate information in a very promptly, comprehensive and effective way. In addition, China's relative authorities also utilize their accounts in Wechat and Weibo and mobile applications to reach a larger user base. This deep integration offers people trustworthy and official first-hand information, and could effectively clarify and refute rumors. At the peak of the pandemic from January 20 to 31 2020, over 26,000 governmental Weibo accounts were posting more than 550,000 pieces of disease-control-related information, drawing over 11.4 billion views (CIKD, 2020).

Moreover, the scientific knowledge on disease control is taught to the public in a very understandable and straightforward way with the forms of short videos and articles of new media. Some Covid-19-related short videos on platforms like Tiktok could reach over a million clicks. Local governments have learned from each other's production to enrich their toolkits.

Medical supplies

Not only does new media help to release important notices timely, but it also mo-

[7] Ministry of Industry and Information Technology. (2021). "Communications Industry Statistical Bulletin 2020". http://www.gov.cn/xinwen/2021-01/26/content_5582523.htm

bilizes global-wide social support and guarantee basic necessities for the quarantined. As new media provides smooth information circulation and expression mechanisms, it enables the whole society's collaboration in pandemic prevention by channeling the communication between the government and the public.

To address the problem of limited medical supplies, some hospitals and local governments called for help via new media. With its fast and wide information circulation, all sectors of the society, including social organizations, enterprises, and volunteers immediately took action to contribute their efforts.

Digitalization for a more resilient recovery from Covid-19

Digital technologies have been enabling a resilient recovery from Covid-19 through e-commerce platforms, digital coupons, and subsidies.

As the livelihoods of a large number of farmers from poor areas are impacted by Covid-19, the e-commerce platforms have introduced measures to help them. Utilizing the platforms' advantages, they have set up "poverty alleviation special sections" to improve the sales of agricultural products. This has also prompted a further boom in rural e-commerce. Some regions adopt cloud computing, big data, the Internet of Things, and other new technologies to develop smart agriculture and science-based agriculture. While helping farmers overcome the challenges brought by the pandemic, they are also improving science-empowered agricultural management to increase production.

As the demand side is what fundamentally drives the small and medium enterprises' production resumption and recovery from Covid-19, 17 provinces or municipalities have issued digitalized consumption coupons to stimulate consumption, totaling more than 5 billion RMB (Bank of China, 2020). For example, to encourage local consumers and support the businesses in Wuhan, with the ease of disease control from April 19th to July 31st, 2020, consumption coupons worth 2.3 billion RMB were distributed via platforms like Alipay, among which 500 million was funded by the government, and the rest 1.8 billion by the platforms (Sina Tech, 2020).

The State Grid in Hangzhou Xiaoshan District provides power supply guidance and subsidies for small and medium enterprises in need (Jin, 2020). For enterprises that cannot start normal operations or resume work temporarily, they can apply for special treatment such as capacity reduction and suspension, so that they are not subject to certain restrictions and could save cost. Enterprises could log on to the State Grid app to check if they have benefitted from the subsidies. Through big data detection, technical guidance, and door-to-door service, the company ensures safe and reliable power supply and presses the "fast forward button" for enterprises to resume work and production (Jin, 2020).

Policy measures to manage the risks associated with digitalization

As digital technologies provide powerful tools for government and the society to combat and recover from Covid-19, there are some risks associated such as data leakage and the digital divide. To overcome these risks appropriate policy measures have been taken.

Personal data protection

Data protection plays a prominent part while utilizing digitalization in disease prevention and control. The Chinese government has recognized the implications of data privacy and taken various measures to ensure the legitimate use of personal data.

First, the Cyberspace Administration of China released regulations on February 9, 2020, to provide a clear legal basis and technical specifications to protect personal information while using big data. The Notice of Effectively Protecting Personal Information and Using Big Data to Support Joint Prevention and Control offers clear guidance on the authorized entity to collect the relevant personal information, national standard requirements on data collection, use of personal information collected, and the entities' responsibilities for data security and protection (Jiang, 2020).

Second, Chinese governments at all levels have taken serious measures to ensure the strict implementation of these laws and regulations. While releasing Covid-19 case updates and maps on a daily basis, the telecommunication companies and their collaborative partners all take the responsibility to adhere strictly to the data protection standards.

Third, local law enforcement agencies enforce the data protection laws very stringently. Local authorities in Guangdong, Tianjin, and Inner Mongolia have punished individuals who have disclosed others' personal information illegally.

Further laws and regulations on personal information protection and data security are now under discussion and formulation in China's National People's Congress with principles of anonymization, data minimization, purpose limitation, and legitimate use. The government is trying its best to provide a more solid legal basis for the use of big data in both normal and emergencies.

Digital divide

While reaping the benefits of digital technologies in disease prevention and control, it is very important to pay attention to the potential gap between those frequent Internet users and those not familiar with or do not have access to the Internet. China has taken policy measures to manage the risks of the digital divide.

Successful adaptation of online education requires well-established digital infrastructure, network affordability, and strong digital information literacy for teachers and students. As primary and middle schools in China adopted online education since mid-February in 2020, the digital divide in urban and rural education has emerged. Thanks to the efforts made over recent years on rural network infrastructure development, the proportion of administrative villages connected

to optical fiber reached more than 96%, and that of villages in poverty connected to broadband reached more than 94% (CIKD, 2020). To further improve the online learning experience of the rural students, the Chinese government, enterprises, and schools have paid great attention to this digital gap and worked collaboratively to address the problems such as lack of digital devices, no network coverage or weak signal, and gaps among teachers in digital information literacy across different regions and generations.

Firstly, government agencies and telecom enterprises have taken quick steps to improve the digital infrastructure such as base stations and broadband networks in remote rural areas. For example, workers from China Tower worked day and night to construct base stations in remote villages in Tibet and Yunnan within a dozen days so as to improve the learning conditions for the students (CIKD, 2020). In addition, live classes on TVs via the "DBS (direct broadcast satellite) + education" mode enable primary and secondary school students to access free online resources provided by China's National Cloud-Platform for Educational Resources and Public Service and China Educational Television (CIKD, 2020).

Secondly, to address the affordability issue of online education, the government has specific policies for poor families regarding broadband speed improvement and mobile data payment. Enterprises and charities also donated devices such as mobile phones and laptops for students in need. Major Internet companies have offered free online classes to students, and the telecom companies also provided data allowance to ease the payment burden (CIKD, 2020).

Thirdly, to mitigate the divide in teaching capacities, the Ministry of Education and the schools have provided teachers with training sessions (CIKD, 2020). Apart from that, rural teachers with little experience with online teaching before have also been proactively seeking all kinds of opportunities to improve their skills and sharing successful tips with each other. Students can also access high-quality teaching resources produced by top-performance teachers nationwide, which also helps to bridge the digital gap in education.

In response to the intergenerational digital divide, grassroots communities have been playing an active role. They have organized volunteers to make frequent calls to the old, especially those living alone to understand whether their basic living needs have been taken care of. They also deliver daily necessities and personal protective equipment such as masks and hand sanitizers to the elder people's homes. In the meantime, the local governments ensure that the information on disease prevention and control is also disclosed to those without mobile phones, in case they miss out on important policies and guidance. Public spaces like supermarkets and hospitals also set up assistance for the old to register their information if they do not have the travel pass "health code."

Conclusion

Digital solutions for society and the government are spurred by social needs from combating and recovering from Covid-19. Digital technologies will be continuously shaped by social needs. And as the priorities of the society and the government shift from pandemic control to economic recovery, some of the further development of digital solutions could achieve even greater roles to promote high-quality socioeconomic development for the country. However, we should also be mindful that certain demands boosted are more temporary than others, and overinvestment in those should be avoided.

Specifically, digital literary among all sectors of society across regions and generations will be continuously improved. The level of digitalization could even define the development of urban governance and the core competitiveness of cities. Digital governance will enter into a faster track, and the digital identification system will become the social infrastructure to support it. In the future, when dealing with "black swan" events like Covid-19, the digitalization of the supply chain could define winners and losers for businesses with different levels of resilience.

As the pandemic influences all provinces in China, difficulties arise during cross-city and cross-province data exchange, and data governance. It is now evident that timely information, data sharing, and adequate emergency response capacity have become prominent issues to respond and recovery from the pandemic. In special scenarios like this, only national-level big data governance can successfully coordinate the local efforts. Joints efforts from different departments and different levels of governments, businesses, and society are needed. Upgraded digital solutions for the society and government encompassing the national platform, local e-government, smart city, data governance, and regulation of supply chain are on the way to ensure a more resilient and sustainable recovery from Covid-19.

References

- ✓ ASKCI.com. "This year's express delivery volume has exceeded 20 billion pieces. What will China's express delivery volume reach in 2021?" https://new.qq.com/omn/20210325/20210325A07KV200.html
- ✓ Bank of China. (2020). "Domestic Demand Will Lead to Full Economic Recovery in China". https://research.hktdc.com/en/article/NDMwNDM0OTcz
- ✓ Cao, Y. (2020). "Alibaba, Tencent, Jingdong and Huawei have been making efforts. What is the attraction of Internet medical treatment?" https://www.jiemian.com/article/4889253.html
- ✓ Chen, L. (2021). "Analysis of the market status and development prospects of China's online education industry in 2021". https://www.qianzhan.com/analyst/detail/220/210409-18e88524.html
- ✓ CIKD. (2020). "What roles do new media play in the fight against COVID-19?" https://covid-19.chinadaily.com.cn/a/202004/24/WS5ea23b3ca3105d50a3d18810.html

- ✓ CIKD. (2020). "How to bridge the digital divide in online education?" https://covid-19.chinadaily.com.cn/a/202005/08/WS5eb5049ca310a8b241154449.html
- ✓ Cnr.cn. (2021). "Intime and Taobao have teamed up to invite 1,000 brand shopping guides to live stream at home". http://tech.cnr.cn/techgd/20200210/t20200210_524967916.shtml
- ✓ Dai, J. (2021). "The Active Role-Digital Economy Played in China's Fight against COVID-19", unpublished.
- ✓ Jiang, X. (2020). "Pandemic spurs digital adoption". http://global.chinadaily.com.cn/a/202008/31/WS5f4c49c7a310675eafc56642.html
- ✓ Jin, L. (2020). "Saved 175,000 RMB in electricity bills with one phone call! Zhejiang Xiaoshan electric power's big data is formidable!" https://power.in-en.com/html/power-2355694.shtml
- ✓ Liu, S. (2020). "Application of digital technology in epidemic prevention", unpublished.
- ✓ Ministry of Industry and Information Technology. (2021). "Communications Industry Statistical Bulletin 2020". http://www.gov.cn/xinwen/2021-01/26/content_5582523.htm
- ✓ MobTech. (2020). Teleworking Industry Insights Report 2020.
- ✓ People.cn. (2020). "National Health Commission: Internet diagnosis and treatment in affiliated hospitals increased by 17 times compared with the same period last year". http://health.people.com.cn/n1/2020/0320/-31641811.html
- ✓ Sina Tech. (2020). "Wuhan issued 2.3 billion consumer vouchers that can be claimed by Alipay". https://tech.sina.com.cn/i/2020-04-17/doc-iircuyvh8221285.shtml
- ✓ Whitelaw, S., Mamas, M.A., Topol, E. and Van Spall, H.G.C. (2020). "Applications of digital technology in COVID-19 pandemic planning and response". Lancet Digital Health.
- ✓ Yu, C. (2021). "Visit the e-commerce "Gigafactory": Digital empowers manufacturers to get rid of price battles". https://m.21jingji.com/article/20210407/33e0e36ddf0385809e7b45f4a5d7b335.html

Tool to Track IP Policy Information during COVID-19 Pandemic

The World Intellectual Property Organization (WIPO) has launched a new tool that tracks COVID-19 related intellectual property (IP) policy changes or other measures being implemented by WIPO member states in their response to the global pandemic. This is the latest in a series of measures taken by the Organization in relation to the COVID-19 pandemic.

Many national and regional IP offices are implementing measures to assist applicants and owners of IP rights, for example by providing extensions of time or grace periods for fee payments. In addition, a number of member states have or are considering special measures such as compulsory licenses, should potentially relevant products and technologies be identified.

The WIPO COVID-19 IP Policy Tracker provides information on measures adopted by IP offices in response to the COVID-19 pandemic, such as the extension of deadlines. In addition, the policy tracker provides information on legislative and regulatory measures for access and voluntary actions. With an initial group of a dozen countries, the COVID-19 IP Policy Tracker will be updated regularly. It is freely accessible through a database interface.

The Organization has also launched a new search functionality for its global patent database, PATENTSCOPE, to facilitate the location and retrieval of information contained in published patent documents that may be useful for innovators developing new technologies to fight the COVID-19 pandemic.

For more information, access:

https://www.wipo.int/covid19-policy-tracker/#/covid19-policy-tracker/ipo-operations

Ensuring Corporate Resilience via a Strong Corporate Culture

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Abstract

This article presents six practices to develop and nurture corporate resilience via a strong sustainability organizational culture. Derived from our research, these practices are: identifying virtues, social and environmental responsibility and innovation as core values; leaders acting as models according to these values; growing own managers to continue the corporate culture; designing communication channels to emphasize the core values among employees; using the core values as criteria to recruit new employees; avoiding employee layoff to preserve the core values even in times of financial crisis. Practical guidelines and specific examples are provided for small and medium-sized enterprise (SME) owners in the Asia-Pacific region to adapt the six practices to enhance their own corporate resilience.

According to a coronavirus disease 2019 (Covid-19) Impact survey (NXPO, 2020) by the Thailand's Office of National Higher Education Science Research and Innovation Policy Council, a majority of small and medium-sized enterprise (SME) respondents indicates that they have experienced over 50% income drop and have laid off their employees to sustain their businesses. Among challenges that these SMEs are encountering include order cancellations, reduced sales, a shortage of working capital, inability to import raw materials from countries affected by the pandemic.

Given the impact, have you ever wondered why during the Covid-19 pandemic some companies are doing just fine, while others are struggling to survive? Increasingly, corporate leaders have recognized that corporate sustainability is critical to the future of their corporation. Corporate sustainability also includes an organizational ability to go through a crisis introduced by abrupt environmental changes and often to bounce back from the crisis to become even stronger. Corporate resilience, that is. Increasingly, more and more corporate leaders realize that a strong sustainability organizational culture helps to unite organizational members to stay together and persist on during a difficult time. Often, sharing the same sustainability vision, these members are willing to sacrifice their own benefits to save their organization in a tough time. Through a widely shared organizational culture, organizational members are allowed to make a decision to respond timely and effectively to the rapidly changing business environment, a result of which is corporate resilience. In developing such a capacity, many corporations that focus only on the "hard" side are moving toward managing the "soft" side of the corporation. In particular, organizational culture has been singled out by sustainability experts as the most important factor responsible for sustainable organizational success or failure (e.g., Kantabutra, 2021). Our research over a decade also indicates that it is this strong sustainability organizational culture that plays a major role in helping corporations to go through abrupt crises successfully (Ketprapakorn, 2019). Clearly, the kind of organizational culture that leads to corporate sustainability is one that promotes an appropriate use of technology and innovation, particularly those from local wisdoms and materials.

Even though many corporate leaders realize that corporate sustainability can be achieved through nurturing a strong sustainability organizational culture, and that corporations need to align the decision with the organizational culture, they have been struggling to incorporate sustainability into their organizational culture (Kiesnere and Baumgartner, 2019). The question they have in their minds is how to develop and maintain an organizational culture that is conducive to corporate sustainability. Here, we provide the answer.

Based on our research of sustainable SMEs in Thailand (Ketprapakorn and Kantabutra, 2019), we provide six simple steps in Figure 1 below for SMEs owners to develop and nurture a sustainability organizational culture. We also explain each step one by one and give examples from SMEs in our studies to show how they adopt the six practices. We note that although these practices are derived from SMEs in Thailand, our research has also indicated that they can be found in sustainable enterprises in other parts of the world as well (e.g., Kantabutra, 2017; Ketprapakorn, 2019). Therefore, SMEs in the Asia-Pacific region can certainly adapt them to their context.

According to our research findings (e.g., Ketprapakorn and Kantabutra, 2019), SME owners should start by identifying or re-confirming their organizational vision. As a matter of fact, a good vision statement is always the start of a great culture (Coleman, 2013) as it guides organizational values and serves the whole organization with a higher-order purpose. Our decades of research has provided some guidelines for corporate leaders in Table 1 below for characteristics of an effective sustainability vision statement (Kantabutra, 2020)

Figure 1: Sustainability organizational culture development practices

as shown in Table 1 below. These vision characteristics contained in a vision statement help to facilitate the vision sharing process toward developing a strong sustainability organizational culture. An example of a vision statement meeting these criteria is below.

"To be a leading socially responsible healthcare provider in Asia."

After a sustainability vision statement is developed, SME owners need to identify a variety of virtues, social and environmental responsibility and innovation as the corporate core values to support the attainment of the vision. These virtues are quite specific to Asia as they include such Asian values as perseverance, generosity, and humility. In addition, the values of social and environmental responsibility and innovation often lead to a smooth organizational adoption of relevant technology and innovation geared toward solving the existing social and environmental issues. Both vision and values, in turn, inform all corporate decision-making. Not only organizational members, but the vision can keep stakeholders oriented when it is deeply genuine and prominently displayed. While a vision conveys the higher-order purpose, values work to guide and shape the behaviors and mindsets of organizational members and often stakeholders to attain that vision. This foundation practice must be done first, prior to performing the other five practices.

Next, the SME owners should consistently behave as a role model according to these values to show their employees how they should live the values. They should invest to develop their own managers to continue their corporate cultures by avoiding to bring in an outsider to join the management team. They should design communication channels to emphasize the core values among employees all the time. These communication channels include, for example, company poems or company songs, and symbols on employee uniforms and shared events where employees usually gather. Technology-mediated communication channels such as different social media platforms can also help to communicate the sustainability vision and values. They should also use the core values as criteria to recruit new employees and avoid laying off employees even in times of a financial crisis to preserve the core values. SME owners adopting these practices can expect their businesses to have corporate resilience. Each is discussed below with examples from "sustainable" SMEs in our research (Ketprapakorn and Kantabutra, 2019). All of them have the capacity to deliver competitive performance, endure difficult times, and maintain a market leadership over time.

Identify vision-critical organizational values

Unlike typical companies where core values are simply written statements, sustainable enterprises live their core values. They regard social and environmental responsibility as a given by investing in it, often beyond the legal or standard requirement. Often, the investment is about technology or innovation development, including R & D for environmentally friendly raw materials. They also take into consideration such values as generosity, perseverance, and social and environmental responsibility as part of employee performance evaluation. Employees are encouraged to suggest their ideas, nurturing organizational innovation. They also have a system to promote innovation. Social and environmental responsibility underpins the organizational philosophy of these sustainable SMEs. Whenever there is a demand to invest in protecting the society and environment, these SMEs do so willingly. Although there are obvious financial gains from being a good organizational citizen, they invest because it is the "right thing to do."

"We brainstormed with staff for the shared values that help create Nithi Foods' organizational culture. We started with the existing values, after which we did the interview (with staff). Finally, we came up with what we called Nithi Foods 3C. The 3C stands for credible, creativity and care."

Managing Director, Nithi Foods, Thailand

"My mother always tells us that perseverance makes us virtuous. Anyone who perseveres will prosper. This includes our employees. No matter what happens, we have to persevere to be virtuous. We must help each other, whether among staff or even their relatives."

Human Resource Department Manager, Phung Noi Bakery, Thailand

	Farm Chokchai	PlanCreations	Phung Noi Bakery	Dhanabadee Ceramic	Nithi Foods
Location	Nakornrachasrima	Trang	Chiangmai	Lampang	Chiangmai
Type	Agribusiness and tourism	Wooden Toys	Bakery	Decorative ceramic ware	Spices and seasoning
Year of establishment	1957	1981	1984	2010	1998
Estimated no. of employees	1,100	800	700	195	50
Market	Mainly domestic	International	Domestic	International	International

Table 1: Sustainability vision characteristics

Characteristics of Effective Sustainability Vision Statements	Definition
Brevity	Contain sestimatedly 11-22 words
Clarity	Points directly at an overarching goal to be achieved
Abstractness	Indicatesa longer-lasting organization that is desirable to organizational members
Challenge	Challenges organizational members to persist on to deliver a desirable sustainability outcome by representing a realistic degree of discrepancy between a sustainability vision and its status quo
Future orientation	Suggests the long-term perspective of an organization
Stablity	Is unlikely to be impacted by changes in the environment
Desirability or ability to inspire	Indicates a goal that inspires organizational members
Stakeholder satisfaction imagery	Contains content about satisfying a wide range of stakeholders

"I think the culture at Plan Toys is planet preservation, whether it is about products or whatever. We utilize everything efficiently. That is why each employee does not do anything big but do some little things to help such as plastic bags reduction. Instead, we use 'Pin To' (tiffin carriers)"

HR staff, Plan Creation, Thailand

"I think we have a cooperative culture. When we have an urgent task, everyone cooperates willingly. Another part of our culture is problem-solving. We like to help each other in tackling a problem… I think this is part of our culture that rooted deeply in our organization."

Executive Vice President & Human Resources Strategist, Farm Chockchai, Thailand

"We groom our staff to be honest with themselves, customers and co-workers. Even with subcontractors who sell and buy our products, we have to be honest. To be in the society, we have to develop ourselves continuously. We always improve our products and innovation in the company. Finally, we cannot stand alone. We are happy, so is the society…This is our core value."

Managing Director, Dhanabadee Ceramic, Thailand

When SMEs promote a variety of virtues, such as social and environmental responsibility and innovation as their core values, employees are encouraged to develop in-house technology utilizing local wisdoms and materials and produce sustainable and innovative products and services, which responds to the increasing market demand and allows the companies to enhance their organizational capacity to maintain a market leadership position. Sustainable and innovative products and services result in a larger market share and profitable growth, bringing healthy corporate finance which in turn immunes the companies in times of crisis.

Leaders acting as a role model

Top managers at these SMEs behave consistently with their values, because consistent behavior reflects leadership's integrity defined as having desirable character and conviction, and being trustful and trustworthy. Such behaviors also include technology adoption and suggesting creative ideas to nurture organizational innovation. Leadership's integrity is clearly a critical attribute in superiors whose subordinates look for and admire. Integrity is important as employees recognize too soon to what extent their managers essentially stand behind the values, within their minds and hearts. The moment the employees begin to question the seriousness of their managers toward the values, cynicism is invariably the consequence. This explains how a top manager's commitment to the values is closely related to employees' trust in the top managers. An untrusted manager is unlikely to achieve commitment from the employees to shared goals.

"Our managers work very strictly. They act as a role model. They are polite and do not cheat on tax. They are responsible to clients by ensuring that their suppliers are ones that look after hygiene of their individual employees. It is common that such suppliers cost higher, we still consider it worthwhile."

Marketing Department Manager, Nithi Foods, Thailand

"When we were to buy a car, we want an electric car. But an electric car was not available so we bought a hybrid car instead so we could show employees how to live a core value of environmental responsibility."

Managing Director, Plan Creations, Thailand

"It (the organizational culture) comes from the bosses. My bosses act as a role model. The gentleman-ness is from the founder, and the moral integrity is from his wife. The son (the top manager now) is a model for a new generation with creativity and enthusiasm. This pushes us to think creatively. It is organizational culture."

Retail Business Director, Farm Chokchai, Thailand

"She is a good leader. She believes a good example is more valuable than preaching. She is always an example of perseverance. Although she is the top manager, she works out every detail, much more than anyone in this company"

Administration Department Manager, Phung Noi Bakery, Thailand

"I am happy as part of this journey. In the past, Mr. Panasin (Managing Director) went out to get an order. I always went with him. I am proud that he never leaves me. I love this place. Whatever I can do to help, I will… I love this place like my home. It is where we make our living."

Staff, Dhanabadee Ceramic, Thailand

These findings are also supported by our previous research at Sa Paper Preservation House, a small mulberry tree paper product provider in Thailand (Kantabutra and Suriyankietkaew, 2013). The owner acted as a role model to help to maintain a high level of morale among staff, consistent with its core ethical and environmental responsibility values. She demonstrates to her employees how to use local wisdoms and technology to produce different colors from natural materials such as flowers and tree barks. This natural color technology is not harmful to the environment and in a high demand among customers from developed countries in Europe. This in turn forms a solid cultural foundation there.

The role model representation of these values by top leaders are considered as a form of motivation as employees understand how it looks and feels to live these values. When employees see their top leaders practicing these values, they are intrinsically motivated and would like to live the values too. Therefore, both top leaders and their employees are molded together to work towards organizational goals. This unity often helps to enhance organizational capacity to endure a crisis, where employees support each other in going through the crisis.

Develop values communication channels

Sustainable SMEs promote communication activities to echo their core values systematically and continuously in employees' hearts and minds. In particularly, technology-mediated communication channels have been used to frequently and massively convey the vision and values messages to employees. As shown earlier, Nithi Foods identifies "Credible, Creative and Care" as core values which are printed on employee shirts and office walls so that everyone is reminded of the corporate values all the time. "Credible" means they are trustworthy people. "Creative" means they learn, they think, they innovate. "Care" means they care for each other, the environment and society.

"Our quality control department has a slogan of 'Precise, Quick and Neat'. 'Precise' means accurate and reliable information related to the product quality given by our team. 'Quick' means having a short lead time in servicing our customers, so they have more time to make a decision. 'Neat' means making our product looking good and reliable."

Managing Director, Nithi Foods, Thailand

"She (Managing Director) always teaches us either through songs, slogans or poems. All of these begin with perseverance…Everything starts with perseverance."

Administration Department Manager, Phung Noi Bakery, Thailand

"Our corporate culture is primarily communicated through songs to both teach employees and boost up their morale."

Assistant Sales and Marketing Department Manager, Phung Noi Bakery, Thailand

"Mostly we work together through our internal activities (e.g. carbon footprint, 4R Program —reuse, recycle, replace and reduce). Everyone is dedicated to achieving our goals. This is Farm Chockchai blood. It is in the blood."

Retail Business Director, Farm Chockchai, Thailand

"Our company has a project called QCC where people who have creative ideas to reduce waste can propose their ideas. We have cookies as a reward. We develop staff thinking."

Manufacturing Department Manager, Dhanabadee Ceramic, Thailand

"We have a shared event twice a week called 'Berk Ban Yam Chao' (rise and shine in the morning) which gathers employees together for a morning discussion where we report to employees about corporate news and activities or anything we want to communicate. We also have other channels such as a board."

A Director, Plan Creations, Thailand

Our previous research supports these findings. At Bathroom Design (Kantabutra, 2011), a leading sanitary ware and products provider, the ethical value was evident. Employees were paid a higher rate than the industry rate with a promised annual bonus. They were always preached to adhere to the five Buddhist commandments via many shared events. For example, the company frequently invited Buddhist monks to come to preach employees about morality and virtues. Another core value of Bathroom Design was innovation. Bathroom Design really nurtured innovation throughout, including ideas from individual employees gathered via "Creative Saturday," a shared event run every Saturday. Many times, the ideas brought about systematically applying Thai wisdom and local materials in the business, allowing the company to be highly competitive in the world's market. Consequently, Bathroom Design is outstanding in terms of developing its own technology from the Thai wisdom and local materials as it has continued to win numerous prestigious awards locally and internationally for their innovation that often helps to deal with the existing social and environmental issues such several environmentally friendly bathtub models and a bathroom designed for the elderly as the world is moving into the aging society.

Sustainable Thai SMEs develop a large variety of values communication channels, such as company poem, company song, symbol on employee uniform and shared events to continuously echo their core values in the employees' minds all the time. In particular, these communication channels embed shared values in employees. In turn, the corporate values act as an unwritten rule to guide employees' behaviors, enabling employees to make desired decisions and thus to prevent undesirable actions. Likewise, during a time of crisis which employees are demotivated, these forms of value communication could effectively lift up their morale and reunite them quickly to work toward recovery.

Promote from within the organization

Top management teams at these SMEs realize the need for a continuation of corporate culture and its effects on the company's performance particularly after a time of crisis. More critically at the top level, insider CEOs continue the culture, while outsider ones destroy it. An outsider manager can come in and actually destroy the organizational sustainability system via changing the culture

(Bergsteiner and Avery, 2006) knowingly or unknowingly. The internal promotion also offers benefits of knowledge transfer and collective insights. Financially, it reduces recruitment costs. The prevailing practice of employing outsider executives is a major challenge to become and remain a sustainable company with a cohesive culture. By continuing their cultures and core values, the sustainable SMEs strive for technology and innovation that allows them to respond to the changing external context, including pressing social and environmental issues. Organizational members are held together by this cohesive culture particularly when their businesses are going through crises.

"We promote internally and continuously develop people to meet the requirement of our expansion. Instead of grasping the opportunity and taking in new 10–20 employees at once, we rather gradually hire two or three new employees each year to grow together with our business."

Managing Director, Nithi Foods, Thailand

"If a position requires specific skills, we will promote from within. We usually ask a functional director for opinions first and consider staff performance results and attitudes. … We recruited an external person only when a job required specific skills and we could not find an internal candidate, which is estimated at less than 20%"

Assistant Director for Finance and Administration, Plan Creations, Thailand

"At one point, we will have to find successors for all positions. The founder and people of his generation now are over 50. We have to find successors who are about 40 and still active. But we do have criteria for successors."

Executive Vice President, Farm Chockchai, Thailand

"This company has grown internally. We almost 100% promote from within. Only for technicians, we recruited experienced ones from outside the company"

Human Resource Manager, Dhanabadee Ceramic, Thailand

"I recruit internally first. I also support those who have an idea for training"

Assistant Accounting Department Head, Phung Noi Bakery, Thailand

However, when there is a lack of skills or knowledge in their organizations, the sample SMEs take in outsiders but very carefully to make sure that the outsiders share their core values seriously. Sustainable SMEs prefer to promote their own managers from inside in order to continue their corporate culture and underlying values. Typically, insiders have firm-specific knowledge and skills, a foundation for in-house technology and innovation development, which are critical to enhancing organizational capacity to effectively respond to often abrupt market changes. Moreover, outsiders, if not selected properly, can come close to destroying the existing strong culture and its underlying values that are important to organizational effectiveness.

Use the values as criteria to recruit new employees

The sustainable SMEs have a very strict entry standard to ensure that new recruits fit their corporate cultures. Very careful, they employ many techniques to discover the attitudes and values of job applicants. Once new employees are ensured to share their core values, managers do not have to spend time to unite them behind the core values, and the corporate culture can continue.

"An interview question I often use is whether you have had a big obstacle in your life such as a big family problem or a crisis at work or school. I can spot from their answers whether they had been trying hard to overcome the obstacle or not. We regard a perseverant candidate as consistent with our corporate value."

Managing Director, Nithi Foods, Thailand

"Persevere to work for a living, don't fly too high, love cleanliness, collect intellects and value harmony. These are the qualifications of our employees. Everyone must have them. "Persevere to work for a living" means everyone must be diligent to work. Everyone must deliver. "Don't fly too high" means everyone must live a moderate life."

Chairman, Phung Noi Bakery, Thailand

"We ask them different questions such as whether you are a good people, what it means to be a virtuous person. We ask them to give three examples of when s/he has done good deeds."

Human Resource and Administration Department Manager, Plan Creation, Thailand

"Chockchai Farm does not encourage unethical persons. That is why you can observe that our employees do not do thefts. If theft happens, we will punish ones who cause it. To get ethical behavior, we have to promote the right employees. If you want to be with us for a long time, you must be honest and straight forward."

Executive Vice President & Human Resources Strategist, Chockchai Farm, Thailand

"In the application form, we ask the applicant to inform us about his Facebook account so that we can look up to determine what kind of a person he is. However, this is optional. All of this is only a preliminary screening because we think no one is perfect. If he has some good parts and we can nurture him to be what we desire, we can continue together. If not, that is the end of it."

Managing Director, Dhanabadee Ceramic, Thailand

Our previous research lends support to these findings. At Bathroom Design (Kantabutra, 2012), diligence, perseverance, honesty, integrity, dependability, generosity, frugality, and other virtues were given priority in its recruitment process. The responsibility for the society and environment as well as "Thainess" comprised the desired personal values. The company's philosophy fostered a corporate culture of respect and collaboration among employees. As part of the culture, employees looked after not only themselves but also one another. In addition, employee performance evaluation criteria included morality and virtues.

Sustainable SMEs use the core values as criteria to recruit new employees to make sure they get employees who share the company's direction and existing values. Moreover, selecting employees who do not share the company's direction and values could potentially lead to organizational ineffectiveness where organizational resources are utilized in ways that do not contribute to corporate goals. In a time of crisis, employees who share values and have a relatively high attachment with the company often stay, making it more quickly to recover.

Avoid employee layoff

In these sustainable SMEs, it's not the same in a Western firm. In a Western firm, a staff layoff probably shrinks the workforce size, while the remaining staff is happy to stay. Then, the Western firm expands by recruiting new employees later when an economy picks up. In these SMEs, the cultures and contexts in Asia are very different. Instead, a staff layoff causes the remaining staff morale to be shattered. For these SMEs, once their morale is gone, things fall apart. Among them, a strong corporate culture is deeply rooted in organizational history. The highly coherent corporate culture helps these sustainable SMEs to survive difficult financial and social situations during which no employee was laid off.

"We never lay off our employees even in a financial crisis. The difficulty stays only for a short time. If we persevere to solve the problem, we will get through it. We will rebound to where we were or even to a stronger position. Our employees enjoy good times with us, we also go through tough times together."

Managing Director, Nithi Foods, Thailand

"We could actually purchase a lot of machines. But since we have about 600-800 types of the bakery, if we need to buy machines, how many? One machine can do only one type or a few types at the maximum. Plus, we need a human to monitor them anyway. It is the policy from the Managing Director also that employees are a valuable asset. Each machine can produce according to specifications. One can produce at a maximum of three types of a bakery. But employees can learn to produce new types more and more, so we don't lay off anyone."

Administration Department Manager, Phung Noi Bakery, Thailand

"We don't have a layoff policy, but provide a career path for our employees…We have a clear career path for our employees. For example, temporary workers can be hired as salaried workers. Salaried workers can also become supervisors and department heads."

Factory Director, Plan Creations, Thailand

"We don't fire people. … No matter how advanced technologies we adopt. We cannot do like what happens in the west because our land is not flat like in the west, but uphill and downhill, so we still need humans to do the work."

Executive Vice President & Human Resources Strategist, Chockchai Farm, Thailand

"We don't lay off employees because we regard everyone as a partner. Everyone should not be put in trouble. When we are happy, we are happy together. When we are in difficulty, we try to help each other."

Managing Director, Dhanabadee Ceramic, Thailand

Similarly at Theptarin Hospital (Kantabutra and Ketprapakorn, 2020), a small private hospital, organizational culture was rooted deeply in the history of the hospital. The highly coherent culture enabled the hospital to survive the Asian financial crisis in 1997 during which no employee was laid off. To survive, the salaries of the top and mid-level managers were reduced significantly to save costs for the hospital. Such a reduction was possible only when a very strong teamwork culture exists, demonstrating trust and respect for lower-level employees. This story was told from one generation to another to continue such a culture at the hospital.

When sustainable SMEs avoid an employee layoff, even in times of financial crisis, to preserve their core values, the SMEs essentially enhance their organizational resilience. Keeping employees, who have firm-specific knowledge and skills and share corporate goals and values in times of crisis, helps the SMEs to recover quickly after the economy picks up. While other companies which lay employees off during a crisis have to spend significantly to recruit and train new employees. These sustainable SMEs are ready to pick up with the economy, given that they have employees with firm-specific knowledge and skills, including those knowledge and skills about customers and trade partners, to immediately catch up with the recovering economy.

Impact on corporate resilience

The five SMEs in our present study with a strong sustainability culture have demonstrated an organizational capacity of resilience. Clearly, technology and innovation, particularly environmental and social innovation, plays a critical role in forming such a sustainability culture. Focusing on satisfying a wide range of stakeholders as part of their culture, they have survived several financial and social crises, such as the 1997 Asian economic crisis, the 2008–2009 subprime crisis, the ongoing political crisis in Thailand and the Covid-19 crisis successfully. In addition, they have been able to maintain a market leadership in their relevant industries. We give more concrete examples of corporate resilience below.

An example of corporate resilience (Kantabutra and Punnakitikashem, 2021) is at PlanToys or Plan Creations that could survive the global financial crisis in 2007 by maintaining a gross profit at 6%, during which time its competitors were not profitable. More recently, during the Covid-19 pandemic, Pan Creations is not affected while other businesses in Thailand have been on the decline, due to the fact that it invested in creating an online ordering system and constructing factories in other locations in other parts of the world

"We are not affected by the pandemic. As a matter of facts, our sales volume increases because we invested in building overseas factories and online channels."

Managing Director, Plan Creations, Thailand

Another example of corporate resilience through a social crisis is at Phung Noi Bakery (Kantabutra, 2019). Phung Noi Bakery could successfully survive the Asian Economic crisis, the 2008-2009 Subprime crisis and the ongoing political crisis in Thailand. In 2016, Phung Noi Bakery faced a social crisis where a video clip about using nonedible meat in its sandwich was publicly released possibly by its competitor. In the video clip, it showed a dried shredded pork sandwich (with nonedible meat). The video zoomed at the Phung Noi Bakery logo to suggest that the sandwich belonged to Phung Noi Bakery. The clip was in Thai and Chinese. And there were many clips to follow as well. This caused Phung Noi Bakery to clarify the issue to the public. In such a crisis, stakeholders, including a supplier of dried shredded pork

and a Director from the National Science and Technology Development Agency came to help, as explained below.

"I have run a dried shredded pork factory for more than 30 years. We produce 10 ton per day. Before I became a supplier for Phung Noi Bakery, I had to go through a strict examination process. It was not easy. I can guarantee that my dried shredded pork is of a very high quality. There is no contamination. It is given a five-star rating by the government. The fact that the video clip shows the dried shredded pork in the water, and it becomes cotton has to be proven in front of the media. Our dried shredded pork can be eaten even when it is soaked in the water. When it is burned, it smells like grilled pork, not burning cotton."

A dried shredded pork supplier, Thailand

"Phung Noi Bakery is one of the exemplary SMEs. It has been tested scientifically. It perfectly meets the food standard. In terms of the dried shredded pork, we can test it. Cotton and dried shredded pork may appear similar to our eyes, but once we scientifically test them, we can see they are not the same. Phung Noi Bakery is an example SME that is environmentally friendly since it is located at the heart of the community so it is very careful about water treatment."

Director, Chiangmai Office, National Science and Technology Development Agency, T

"(after the dried shredded pork sandwich crisis) We were worried initially that the sales of our dried shredded pork sandwich and possibly other products would seriously drop, due to the video clip. But it turned out that the video clip and related news about it have helped publicize our company (that we produce high-quality bakery). Our products, including the dried shredded pork sandwich, had an increase in sales instead of declining after the incident."

Human Resources Manager, Phung Noi Bakery, Thailand

Essentially, this is a clear demonstration of Phung Noi Bakery's resilience. Phung Noi Bakery also has the capacity to maintain a market leadership in the northern region of Thailand with numerous awards for its exemplary practices.

Conclusion

In practice, to ensure corporate resilience, SME owners in the Asia-Pacific region can begin by reconfirming their vision ideas and crafting a vision statement that meets the effective sustainability vision criteria above. They then can assess whether their organizational values include the sustainability values of virtues, social and environmental responsibility and innovation. The social and environmental responsibility and innovation often leads to the development of technology and/or innovation that provides a solution to the existing social and environmental issues. They should also invest in developing their employees and promote those who behave consistently with the sustainability values. Clearly, employees are assets as they are invested for. Therefore, SME owners should avoid any employee layoff even in a time of financial crisis, using techniques discussed earlier. Practically, SME owners should design various communication channels, including technology-mediated channels, for communicating the sustainability vision and values. Critically, acting as a role model among SME leaders is an important way to communicate such vision and values or "do what you preach." To continue to nurture the sustainability organizational culture far into the future, SME owners should use the sustainability values as criteria to recruit new employees. These six practices indeed form a system to enhance a corporate capacity of resilience.

References

- ✓ Bergsteiner, H. and Avery, G.C. (2006) How to kill a sustainable enterprise: a not so fictional case. The International Journal of Environmental, Cultural, Economic, and Social Sustainability: Annual Review, 2(3), 95–106.
- ✓ Kantabutra, S. (2012) Putting Rhineland principles into practice in Thailand: sustainable leadership at bathroom design company. Global Business and Organizational Excellence, 31(5), 6–19.
- ✓ Kantabutra, S. (2017) A Thai Rhineland leadership model: in search for corporate sustainability model for Asia. International Journal of Business Excellence, 13(1), 16–40.
- ✓ Kantabutra, S. (2019) Achieving corporate sustainability: toward a practical theory. Sustainability, 11(15), 4155.
- ✓ Kantabutra, S. (2020) Toward an organizational theory of sustainability vision. Sustainability, 12(3), 1125.
- ✓ Kantabutra, S. (2021) Exploring relationships among sustainability organizational culture components at a leading Asian industrial conglomerate. Sustainability, 13(4), 1733.
- ✓ Kantabutra, S. and Ketprapakorn, N. (2020) Toward a theory of corporate sustainability: a theoretical integration and exploration. Journal of Cleaner Production, 122292.
- ✓ Kantabutra, S. and Punnakitikashem, P. (2020) Exploring the process toward corporate sustainability at a Thai SME. Sustainability, 12(21), 9204.
- ✓ Kantabutra, S. and Suriyankietkaew, S. (2013) Sustainable leadership: Rhineland practices at a Thai small enterprise. International Journal of Entrepreneurship and Small Business, 19(1), 77–94.
- ✓ Ketprapakorn, N. (2019) Toward an Asian corporate sustainability model: an integrative review. Journal of Cleaner Production, 117995.
- ✓ Ketprapakorn, N. and Kantabutra, S. (2019) Culture development for sustainable SMEs: toward a behavioral theory. Sustainability, 11(9), 2629.
- ✓ Kiesnere, A.L. and Baumgartner, R.J. (2019) Sustainability management emergence and integration on different management levels in smaller large-sized companies in Austria. Corporate Social Responsibility and Environment, 26, 1607–1626.
- ✓ The Office of National Higher Education Science Research and Innovation Policy Council (NXPO) (2020) Impact of COVID-19 outbreak on Thai SMEs. https://www.nxpo.or.th/th/en/4291/. Accessed: April 2021.

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Off C.G Road, Navrangpura,
Ahmedabad- 380009, Gujarat, India
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E-mail: agriasia@agriasia.in
https://www.agriasia.in/

Sep 29–30, Ulaanbaatar, Mongolia
International New Energy Summit 2021
Contact: Ms. Alyssa Pek
E-mail: alyssa.pek@gwec.net
https://gwec.net/international-new-energy-summit-2021/

Oct 14–16, Bangkok, Thailand
ASEAN Sustainable Energy Week 2021
Contact: Ms. Jittraporn Kulwanich
Tel: +66 2036 0500 ext. 244 & 235
Fax: +66 2036 0588
E-mail: jittraporn.k@informa.com, asew-th@informa.com
https://www.asew-expo.com/2021/en/index.asp

Oct 18–19 (Virtual)
7th International Conference on Low Carbon Asia & Beyond
Contact: UTM Low Carbon Asia Research,
Universiti Teknologi Malaysia,
81310 Johor Bahru, Johor, Malaysia
E-mail: secretariat@iclcaconf.com
https://iclcaconf.com/

Oct 20–21, Singapore
Big Data & AI World
Contact: Ms. Joyce Luk
Conference Producer
Tel: +852 2972 0627
E-mail: joyce.luk@closerstillmedia.com
https://www.bigdataworldasia.com/

Nov 6–8, Phuket, Thailand
2021 6th Asia Conference on Environment and Sustainable Development (ACESD 2021)
Contact: Nancy Liu
Conference Secretary
Tel.: +86-28-86512185
E-mail: acesd@iacsitp.com
http://www.acesd.org/

Nov 9–10, Ho Chi Minh City, Viet Nam
ASEAN Wind Energy 2021
Contact: Jay Hsu
Tel: +86 186 0171 2917
E-mail: Jay@leader-associates.com
https://www.aseanwindenergy.com/

Nov 16–18 (Virtual)
2021 Asia-Pacific Agri-Food Innovation Summit
Contact: Rachel Mackie
Business Development Manager
Rethink Events Ltd, 1st Floor, Huntingdon House,
20a North Street, Brighton, BN1 1EB, UK
Tel: +44 (0)1273 789989
E-mail: rachel.mackie@rethinkevents.com
https://agrifoodinnovation.com/

Nov 17–19 (virtual)
3th Asian Conference on Machine Learning (ACML 2021)
Contact: Secretariat
E-mail: acml21-conf@googlegroups.com
http://www.acml-conf.org/2021/

Nov 26–28, Shenzhen, China
2021 6th International Conference on Renewable Energy and Conservation (ICREC 2021)
Contact: Ms. Rachel Cao, Conference Secretary
Tel: +86-13880104217
E-mail: icrec_conf@163.com
http://www.icrec.org/

Dec 1–3, Bangkok, Thailand
2021 4th Asia Conference on Machine Learning and Computing
Contact: Cherry Chan
Conference Secretary
Tel: +86-28-86512185
E-mail: acmlc@iacsitp.com
http://acmlc.org/

Dec 5–8, Brisbane, Australia
2021 Innovative Smart Grid Technologies Conference Asia (ISGT Asia 2021)
Contact: Arinex Pty Ltd, ABN.28 000 386 676
S3, The Precinct 12 Browning Street
West End, QLD 4101, Australia
Tel: +61 7 3226 2800
E-mail: isgt2021@arinex.com.au
https://ieee-isgt-asia.org/

2022

Mar 9–11, New Delhi, India
IIoT India 2022
Contact: Pinak Gupta
Mobile: (91) 9910112272
E-mail: pinak.gupta@singex.com
http://iiotindia.co.in/

Mar 18–20, Guangzhou, China
2022 6th International Conference on Sustainable Development and Green Buildings (ICSDGB 2022)
Contact: Ms. Yury Yu
Tel: +852-30506939 (HK)
Mobile: +86-19136072802 (Mainland of China)
E-mail: icsdgb@apise.org
https://www.icsdgb.org/

Tech Ventures & Opportunities

Business Coach

Tech Opportunities

Start-up support in Malaysia

Malaysia Global Innovation & Creativity Centre, Malaysia
https://www.mymagic.my/

Early Stage

Idea Lab

Idea Lab is a partnership initiative supporting hackathon/makerthon and Startup Weekend around Malaysia that aims to educate and encourage people on creative entrepreneurial mindset and problem-solving culture through entrepreneurship. Participants must come out with impactful business ideas to pitch in front of panel judges.

Idea Lab enables ecosystem players to collaborate in providing opportunity for aspiring entrepreneurs to develop their idea into actionable solution and sustainable business model.

Bootcamps

MaGIC Bootcamps are intensive output-driven courses for teams to build, test, refine their ideas to produce Minimum Viable Product (MVP) prototypes with the intentions for commercialization.

These Bootcamps are designed based on government initiatives according to Sustainable Development Goals (SDGs) and National Technology and Innovation Sandbox (NTIS) focused areas that coincide with addressing national and global issues.

Mid Stage

Grill or Chill

Grill or Chill (GoC) is a platform for start-ups to showcase their products and get valuable feedback from experts in the start-up ecosystem. Each GoC ends with a networking session where you can mingle and connect with other entrepreneurs in a cosy environment.

Virtual Global Accelerator Programme

An online program to accelerate local & international start-ups from all over the world, with an interest to expand their business in the ASEAN region, to be investment-ready in 3 months. GAP also aims to build a strong ASEAN start-up community by cultivating ASEAN relationships.

Late Stage

Virtual Global Market-Fit Programme

Virtual Global Market-Fit Programme (GMP) provides a platform for high-growth innovative start-ups to explore cultures, understand ways of business, and gain international market access in countries beyond ASEAN. This program aims to provide assistance for start-ups to accelerate growth with new product/solution market-fit strategies expanding to other countries.

MyStartup Hub

MyStartup Hub Programme (MSH) is a soft-landing program for global innovative start-ups from all over the world to establish a business hub in Malaysia. Collaborating with Malaysian ministries and agencies, MyStartup Hub provides assistance in company incorporation, local talent acquisition, and Malaysia's market access.

COVID-19 ASEAN Response Fund

The outbreak of the Coronavirus Disease 2019 (COVID-19) was declared a pandemic by the World Health Organization (WHO) on 11 March 2020. In response to the outbreak of the disease in the region, ASEAN Leaders agreed to the establishment of the COVID-19 ASEAN Response Fund to address both the immediate needs and long-term goals of ASEAN Member States arising from the pandemic.

The COVID-19 ASEAN Response Fund ('Fund') shall serve as a pool of financial resources to provide support to ASEAN Member States in the detection, control and prevention of COVID-19 transmission and in protecting the safety of medical professionals, healthcare workers, frontline workers, and the wider population from ASEAN Member States.

The Fund shall be made equally accessible to all ASEAN Member States for the purpose of, among others, procuring necessary medical supplies and equipment. The Fund shall also be made available to support cooperation in research and development relevant to COVID-19, including research on virology, immunology, and other relevant studies, or research relevant to the development of medical treatments and preventive vaccines; technical support in the planning and implementation of containment and mitigation measures; sharing of best practices; as well as capacity and capability- building of health professionals and other frontline personnel.

For more information, access:
https://asean.org/storage/53-Finalised-and-APPROVED-TOR_COVID-19-ASEAN-Response-Fund.pdf

Startup development in Philippines

Department of Trade and Industry, Philippines
http://innovate.dti.gov.ph/

The startup ecosystem in the Philippines is young, vibrant, and full of potential. Startups introduce innovative products and create new business models that address changing societal and market needs. As such, it is important for the government to support the development of the startup ecosystem to foster an innovative and entrepreneurial culture in the country. Department of Trade and Industry, Department of Science and Technology, and Department of Information and communication Technology, together with other government agencies are working together in order to further develop the Philippine Startup Ecosystem through the implementation of the implementation of R.A. 11337 or the Innovative Startup Act.

The Innovative Startup Act provides benefits, incentives, and other forms of support to the startup ecosystem including the provision of startup visas, expedited processes, establishment of the Startup Venture Fund, Grants-In-Aid, the crafting of the Startup Ecosystem Development Program, and the establishment of Startup Ecozones, among others.

The nurturing of Startup Ecosystems are at the forefront of the government's initiatives in forging partnerships, bridging gaps, and enabling stakeholders to ensure a competitive, innovative, and inclusive Philippines.

SMART (Strategic MSMLE & Startup) Link

SMART Link aims to match leading-edge innovative startups in the Philippines with commercial products to traditional enterprises (MSMLEs) through conducting business-to-business matching sessions or Smart Link Sessions. The objective of this program is to facilitate partnerships and collaborations between startups and traditional enterprises to: (i) provide startups an opportunity to access different markets across different industries thereby increasing revenue streams; (ii) expose traditional enterprises to startups and engage in innovative activities (e.g., through acquisition of digital solutions); and (iii) drive digitalization in traditional enterprises to increase firm productivity, competitiveness, and business resiliency.

Startup Acceleration and Incubation by DTI (startupAID)

The startupAID program aims to assist innovative startups in their product launch, commercialization, and scaling up. It helps accelerate the growth of viable technological startups by undergoing a specialized training program co-developed with partnered startup enablers.

DTI partners with local and international startup enablers to provide a specialized incubation/acceleration program designed to enable tech startups pursue business development, fundraising, and other strategic opportunities. Program participants will be exposed to the enabler's extensive network of corporate, technology, and investment partners as well as mentors and advisors.

International and Local Exposure Assistance Program (ILEAP for Startups)

As one of the lead host agencies of the Innovative Startup Act, the DTI is mandated to support the growth of local startups and the development of the country's startup ecosystem as a whole. By doing so, more entrepreneurial opportunities are facilitated and more job-generating businesses are established. Among the benefits and incentives that host agencies can provide to qualified startups is support to their participation in local or international startup events or competitions.

Global Acceleration Program

The Global Acceleration Program (GAP) aims to assist startups survive their early stages, scale up, and globalize. It seeks to help accelerate the growth of viable technological startups with priority given to those startups that address the challenges brought about by the covid-19 pandemic. Startups will be immersed in the global ecosystem to enable them to pursue global business development, fund-raising, and other strategic opportunities. The program will help startups get across the tail-end of the "Valley of Death" and further increase their market reach and valuation by expanding into regional and global markets.

Pat-INFORMED – The Gateway to Medicine Patent Information

The Patent Information Initiative for Medicines (Pat-INFORMED) provides a service to the global health community, particularly those involved in procurement of medicines, by facilitating easy access to medicine patent information. The data is provided directly by the biopharmaceutical companies and hosted by WIPO.

Anyone can search the Pat-INFORMED database simply by entering a medicine's INN (International Nonproprietary Name) to obtain relevant information about its patent status in a particular country. Uniquely, Pat-INFORMED also provides a facility for procurement agencies to make follow-up inquiries directly with participating companies. While it is not a tool to provide Freedom to Operate analysis, it facilitates access to patent information and can improve efficiency in procurement processes.

For more information, access:
https://www.wipo.int/pat-informed/en/

Registration of technology transfer arrangements in Philippines

Intellectual Property Office of the Philippines, Philippines
https://www.ipophil.gov.ph/

Rule 6. Registration Procedure. The Bureau shall act on requests for registration of technology transfer arrangements based on the following procedure:

6.1. Filing. All requests pertaining to technology transfer arrangements shall be filed with the Bureau and duly stamped "Received" with the date, time, and name of the receiving officer upon receipt.

6.2. Notice of Additional Requirements. Should the Bureau find that the applicant has submitted incomplete or insufficient information and requirements, the Bureau shall issue a Notice of Additional Requirements to the applicant within three (3) working days from the filing of the request requiring the applicant to submit the additional requirements. The applicant shall complete the requirements within fifteen (15) working days from receipt of the Notice of Additional Requirements. Should the applicant not be able to comply with the requirements within the aforesaid period, applicant may request for an extension of another fifteen (15) working days and pay the corresponding fee. Otherwise, the file shall be archived and shall only be retrieved upon submission of the complete requirements and payment of the Document Retrieval Fee. (revised Rule 8)

6.3. Filing Date. Upon receipt of all the requirements as contained in the Notice of Additional Requirements, the Bureau shall issue a Notice of Filing Date within three (3) working days from such receipt. The Filing Date shall be the date when the Bureau has satisfactorily received all the requirements. This date is also the date when evaluation of the request shall commence. (revised Rule 7)

6.4. Decision. The Bureau Director shall decide on the request within twenty (20) working days from the Filing Date. (revised Rules 13, 18, 22, and 24) A favorable Decision shall cause the corresponding Certificates to be issued. Otherwise, appropriate Notices shall be issued to applicant.

6.4.1. Notice of Findings and Notice to Comply. Should any provision of the agreement violate any of the Prohibited Clauses or Mandatory Provisions of the IP Code, the Bureau shall issue a notice to the parties informing them of the violation and requiring them to comply. (revised Rules 20, 22, and 25)

6.5. Issuance of Certificate. Upon the applicant's satisfactory response to the findings and subsequent compliance with the IP Code provisions, and/or after a favorable Decision by the Bureau Director, the Bureau shall issue the appropriate certificate within seven (7) days from receipt of the duly executed and notarized agreement and payment of the required fees for the following as requested: (revised Rules 14, 19, and 21)

a. Certificate of Registration - A certification that a technology transfer arrangement has been granted certain exemption/s from the requirements of Sections 87 and/or 88 of the IP Code;

b. Certificate of Compliance - A certification that the technology transfer arrangement does not violate any of the Prohibited Clauses and conforms to all the Mandatory Provisions of the IP Code;

c. Certificate of Clearance - A certification that a trademark license agreement covered by Section 150 of the IP Code has been cleared for recordal with the Bureau of Trademarks.

6.6 Entry in the Certificate Registry Book. After the issuance of a certificate, the Bureau shall enter in the Certificate Registry-Book the following:

a. Title of the technology transfer arrangement;

b. The parties thereto;

c. Its registration number;

d. The date of registration; and

e. The corresponding type of certificate as enumerated in Rule 6.5 above.

Other information needed by the agency for statistical purposes may likewise be recorded, in accordance with the provisions of the law. (revised Rule 15)

6.7. Publication. The Bureau shall publish in the IPO Gazette all agreements that are granted exemption, registered, or cancelled. The publication shall contain the names of the parties, title and subject of the agreement, the specific exemption/s granted, if any, and the date of cancellation, if such was the case. (revised Rule 33)

Rule 7. General Provisions

7.1. Applicants. Any party to a technology transfer arrangement or his duly authorized representative may file with the Bureau an application for Certificate of Registration, Certificate of Compliance, or Certificate of Clearance (as distinguished under Rule 6.5). Parties may also jointly file such Applications. (revised Rules 5 and 21)

7.2. Requirements. The basic requirements for any request to be filed with the Bureau pertaining to a technology transfer arrangement shall be as follows:

a. Letter request;

b. Copies of the technology transfer arrangement;

c. The duly filled-out sworn application form which shall include a verified statement from the applicant that the agreement is not subject of any judicial, administrative or other proceeding; and

d. Requisite Fees.

Requests for Exemption shall also be accompanied with specifics on the exemptions being requested and the justification for the exemption/so

In case of Requests for Preliminary Review, the applicant may submit either a draft or a duly executed and notarized agreement.

Other documents may be required by the Bureau to support and establish the merits of a request. (revised Rules 4 and 21)

7.3. Amendments. Minor changes on a technology transfer arrangement, such as addition or deletion of products, increase or decrease in royalty rates and other commercial terms, etc. which do not violate the requirements of Sections 87 and 88 of the IP Code, will not affect the findings of the Bureau and will not necessitate another round of review. Such requests for annotation shall be acted upon by the Bureau within three (3) working days from receipt of all the requirements which may include the surrender of a previously issued certificate covering the technology transfer arrangement. (revised Rule 35(b))

7.4. Issuance and Validity of the Certificates. There will not be issued any perpetual certificates and in no case shall any of these certificates exceed the life of the Technology Transfer Arrangement.

Technology Transfer Arrangements which had expired shall not be issued certifications anew unless aforesaid technology transfer arrangement had been renewed or extended in due course.

Only one (1) original Certificate shall be issued to the applicant and the Bureau will maintain only one (1) original duplicate for file. Requests for additional original copies will not be granted. However, an applicant may request for certified true copies of the original duplicate on file.

a. Maximum Validity of the Certificate of Registration and Certificate of Compliance. The Certificates of Registration and Certificate of Compliance to be issued by the Bureau, as the case may be, may carry a maximum validity of ten (10) years from the date of effectivity of the technology transfer arrangement or from the date of issuance of the certificate, whichever is earlier.

b. Maximum Validity of the Certificate of Clearance. The Certificate of Clearance to be issued by the Bureau on account of Trademark License Agreements for recordal with the Bureau of Trademarks, may carry a maximum validity of ten (10) years but may not exceed the expiration of the Trademark registration itself, as appearing in the Trademark Registration certificate.

7.S. Cancellation of Registration. Automatic cancellation of registration shall be made upon receipt by the Bureau of a duplicate original or certified true copy of the registered technology transfer arrangement containing amendments or modifications that violate the Prohibited Clauses and Mandatory Provisions of the IP Code without approval of the Bureau. (Rule 16)

The Bureau may also cancel the registration of the technology transfer arrangement if, after evaluation, the Bureau has established that the justification for the grant of an exemption submitted by the applicant does not exist or has ceased to exist.

Such action will be made only after the parties in whose names the certificate of registration was issued are given an opportunity to be heard. (Rule 16)

In both cases, the parties shall be required to surrender the certificate provided that the surrender of the certificate shall not be a pre-requisite to the cancellation of the registration. (Rule 16)

(Source: Revised Rules & Regulations on Voluntary Licensing (2020), Philippines)

United Nations Technology Bank for Least Developed Countries

The United Nations Technology Bank for Least Developed Countries is a global organization dedicated to enhancing the contribution of science, technology and innovation for sustainable development in the world's least developed countries.

The UN Technology Bank became operational in 2018 and serves the 46 least developed countries (LDCs) and former least developed countries for up to five years after their graduation from the category. Headquartered in Gebze, Turkey, the UN Technology Bank actively engages with national, regional and international partners to deliver its programme and projects which strengthen science, technology and innovation capacity in least developed countries. The UN Technology Bank supports national and regional technological efforts, reinforces partnerships across sectors and helps nations identify and use appropriate technologies to transform their economies and improve livelihoods.

For more information, contact:

https://www.un.org/technologybank/

Registration of transfer of patent and petty patent

Department of Intellectual Property, Thailand
http://www.ipthailand.go.th/

Consideration criteria

The patent transferring contract is a contract with which the assignor grants the right to the assignee right (assignment of patent/petty patent). In this regard, the right transferring shall not exceed the protection period as follows;

- The protection period of invention patent lasts 20 years.
- The protection period of petty patent lasts 6 years, or upon the petty patent renewal application according to Article 65 paragraph 2 the laws.

Conditions of application submission

1. To register a transfer of the patent/petty patent, the applicant shall submit the form as determined by the Director-General, together with the transferring contract of the invention patent/petty patent.
2. Authorization

   2.1. In case the applicant of the patent does not reside in the Kingdom of Thailand, he shall authorize the patent agent/patent attorney registered with the Director-General of the Department of Intellectual Property to act on his behalf. In this regard, the power of attorney shall be presented to the Director-General in accordance with the following regulations;

   (1) If the authorization is done outside the Kingdom of Thailand, the signatures in the authorization letter or power of attorney shall be certified by the authorized official of the Thai embassy or consulate or Director of the office of the Ministry of Commerce located in the country where the principal or power grantor resides, or the person authorized to act on behalf of the said officials or the person authorized to certify the signature according to the law in that country, or

   (2) In case the authorization is done in the Kingdom of Thailand, the applicant shall submit a copy of passport or temporary residence certificate of the principal or power grantor, or any evidence indicating that at the time the authorization was made, the principal or power grantor was in Thailand.

   2.2. The Power of Attorney shall be attached with the revenue stamp of 30 Baht/patent agent/patent attorney/application.

Proceeding according to the official's instruction

1. In case that the official finds a correctable defect in the application, the official shall notify the applicant or his patent agent/patent attorney for the correction. The applicant shall finish the correction within 90 days of the notification reception date. After such period, without the correction, the applicant shall be deemed to have abandoned the application, except the Director-General extends the period for correction as deemed appropriate due to any necessity.
2. After the applicant corrected the application, the applicant shall submit the correction application and the fee to the Department of Intellectual Property or the provincial office of the Ministry of Commerce. The corrected application shall enter the consideration and initial inspection processes respectively, similarly to the re-submission of the application.
3. In case of application submission via the website of the Department of Intellectual Property, the inspecting official shall check the completeness of information and details in the patent/petty patent application, request or other applications based on information and details appearing in the e-patent filing system. In this regard, the applicant shall present the application and supporting documents to the Department of Intellectual Property within 15 days of application number reception date and patent/petty patent application filing date via internet. The inspection of application submitted via internet shall be in accordance with the Notification of the Department of Intellectual Property Re: Principles and conditions for submission of patent/petty patent application, requests or other applications via internet.

Notes

1. The working process starts after the inspection of the documents is completed, as specified in the manual of the public service.
2. In case the application or documentary evidence is not correct or incomplete, the official shall record the defect of the document or indicate the required additional documentary evidence (Record of conditions on application reception). The applicant shall correct the document and/or submit the additional document within 90 days of the application filing date. If the applicant fails to submit all additional documents within the specific period of time, the applicant shall be deemed to have abandoned the application. The official shall return the

application to the applicant and inform the reason of the return and his appeal right.

3. Any person fee paid to the Department of Intellectual Property shall not be refunded in all cases, except
   (1) The law stipulates that the fee must be refunded, or
   (2) The applicant double-paid or overpaid the fee, by which the faulty payment resulted from the mistake of the state official, not the payer. In this regard, the Department of Intellectual Property shall consider the refund case by case.
4. In case the applicant is required to submit many additional documentary evidences, the applicant shall submit all additional documentary evidences in the same time.
5. In case the applicant submits the copy of the documentary evidence, the applicant shall certify the copy of the documentary evidence.
6. In case the applicant submits the document in foreign language, the applicant shall submit the document with Thai translation and the correct translation certification of the translator.
7. In case the applicant or the authorized patent agent/patent attorney does not submit the application by himself, and granted power to the other person to submit the application, the application submitter shall present a sub power of attorney or temporary power of attorney, so that he is eligible to submit the application and sign in the record of conditions on application reception. If it appears that the application and the documentary evidence is not correct or incomplete, and the application submitter is not authorized to sign on the said record, the official shall not receive the application.
8. The working period does not include the time period when the applicant follows the official's instruction or corrects the application, or the period of temporary suspension of registration.

Relevant laws

- The Ministerial Regulation No. 25 (B.E. 2542) issued by virtue of the Patent Act B.E. 2522 (Dated 24 September 1999).
- The Patent Act B.E. 2522 as amended by the Patent Act (No. 2) B.E. 2535 and the Patent Act (No. 3) B.E. 2542

ASEAN Smart Cities Network

The ASEAN Smart Cities Network (ASCN) is a collaborative platform where cities from the ten ASEAN Member States (AMS) work towards the common goal of smart and sustainable urban development. the primary goal of the ASCN is to improve the lives of ASEAN citizens, using technology as an enabler. By focusing on our people, it adopts an inclusive approach to smart city development that is respectful of human rights and fundamental freedoms as inscribed in the ASEAN Charter. The networking of Smart Cities across ASEAN also contributes to enhancing mutual understanding across cultures.

The 26 ASCN Pilot Cities are: Bandar Seri Begawan, Battambang, Phnom Penh, Siem Reap, Makassar, Banyuwangi, DKI Jakarta, Luang Prabang, Vientiane, Johor Bahru, Kuala Lumpur, Kota Kinabalu, Kuching, Nay Pyi Taw, Mandalay, Yangon, Cebu City, Davao City, Manila, Singapore, Bangkok, Chonburi, Phuket, Da Nang, Hanoi, and Ho Chi Minh City.

The ASCN aims to facilitate cooperation on smart cities development, catalyze bankable projects with the private sector, and secure funding and support from ASEAN's external partners. To this end, 33 partnerships have been established thus far.

For more information, access:

https://asean.org/asean/asean-smart-cities-network/#

Startup India Seed Fund Scheme

Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Government of India

https://seedfund.startupindia.gov.in/

Easy availability of capital is essential for entrepreneurs at the early stages of growth of an enterprise. Funding from angel investors and venture capital firms becomes available to startups only after the proof of concept has been provided. Similarly, banks provide loans only to asset-backed applicants. It is essential to provide seed funding to startups with an innovative idea to conduct proof of concept trials.

Startup India Seed Fund Scheme (SISFS) aims to provide financial assistance to startups for proof of concept, prototype development, product trials, market entry, and commercialization. This would enable these startups to graduate to a level where they will be able to raise investments from angel investors or venture capitalists, or seek loans from commercial banks or financial institutions.

The Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Government of India has created Startup India Seed Fund Scheme (SISFS) with an outlay of INR 945 Crore to provide financial assistance to startups for Proof of Concept, prototype development, product trials, market entry, and commercialization. It will support an estimated 3,600 entrepreneurs through 300 incubators in the next 4 years.

The Prime Minister of India announced the scheme in his Grand Plenary address of Prarambh: Startup India International Summit on 16th January 2021. After approval the scheme has been notified on 21.01.2021. The Seed Fund will be disbursed to eligible startups through eligible incubators across India.

Objectives

The Indian startup ecosystem suffers from capital inadequacy in the seed and "Proof of Concept" development stage. The capital required at this stage often presents a make or break situation for startups with good business ideas.

Many innovative business ideas fail to take off due to the absence of this critical capital required at an early stage for proof of concept, prototype development, product trials, market entry, and commercialization.

Seed Fund offered to such promising cases can have a multiplier effect in validation of business ideas of many startups, leading to employment generation.

An Experts Advisory Committee (EAC) has been constituted by Department for Promotion of Industry and Internal Trade (DPIIT), which will be responsible for the overall execution and monitoring of the Startup India Seed Fund Scheme.

The EAC will evaluate and select incubators for allotment of Seed Funds, monitor progress, and take all necessary measures for efficient utilization of funds towards fulfillment of objectives of Startup India Seed Fund Scheme.

Green Invest Asia

USAID Green Invest Asia supports mid-growth agriculture and forestry companies with business strategies, environmental assessments and advice to improve their sustainable commodity production and business practices. Initial focus has been on rice, rubber, timber, coffee, coconut and cacao in Cambodia, Indonesia, Malaysia, Philippines, Thailand and Viet Nam. A partial list of services includes:

- Prepare companies for investment
- Capital matchmaking
- Carbon services
- Certification compliance
- Gender-lens and business advisory
- Environmental and operations management

USAID Green Invest Asia links investors and financial institutions with pipeline in sustainable, low-emission agricultural/ forestry companies, and de-risks lending through improving clients' environmental risk management. We have partnered with firms to support their current and prospective clients; grow their ESG-lending portfolios; and lower their transaction costs.

For more information, access:

https://greeninvestasia.com/

Financing global technology companies in Malaysia

Malaysia Digital Economy Corporation (MDEC) Sdn Bhd, Malaysia
https://mdec.my/

The Global Tech Fund (GTF) of Malaysia Digital Economy Corporation (MDEC) aims to support the following three focus pillars:

1. Nurturing global champions
2. Driving investments
3. Catalyzing digital innovation ecosystem

Nurturing global champions

GTF targets local scale-up technology companies who are ready to go into their first global market or expand their existing global market presence via technology innovation and commercialization of market-driven product/service. We want to see potential Malaysian unicorn in the making. Local technology companies are welcome to set up Centre of Excellence for the benefit of the ecosystem.

Driving investments in R&D&C

GTF targets foreign technology companies to set up Centre of Excellence to conduct high-value technology innovation/R&D activities leading to the development and commercialization of market-driven, innovative product/service for the global market as well as contribute to ecosystem development. (Source from Wikipedia: A centre of excellence (COE) is a shared facility that provides leadership, best practices, research, support and/or training for a focus area.)

GTF supports local and foreign technology companies to:

- Acquire new knowledge and/or
- Develop local talents in the identified technology area/s and/or
- Research and develop new, innovative and market-driven product/service for regional/global customers and/or
- Innovate on existing product/service transformatively for regional/global customers and/or
- Development of new technologies or innovation on existing technologies that will disrupt the market by the introduction of innovative, market-driven product/service and/or
- Establish Centre/s of Excellence to conduct R&D activities leading to development and commercialization of innovative product/service and/or
- Develop the Malaysian ecosystem by conducting ecosystem development initiatives.

GTF evaluation criteria for local and global technology companies

I. Technological merit

- **Solving a problem** – does the product/service address a real challenge in the market or society?
- **Disruptive** – disrupting current methods or current market? Make a real impact in the marketplace or establish a new niche?
- **Innovation** – Unique selling point or first mover advantage? Has barriers of entry that will make replication difficult for competitors. This innovation creates new market, hence increases new customers, extending existing customer base.
- **Proposed approach, technologies, system architecture/design** – relevant, scalable, repeatable, flexible, not obsolete, in accordance to international standards.
- **Key project challenges and mitigation plan** – adequately addressed and well thought off
- **Proposed project timeline, activities, deliverables, and resource allocation** – SMART (specific, measurable, achievable, realistic, and timely)
- **Composition of all the project personnel** – necessary expertise and experience/track record to deliver the project. Involvement of local talents? Effective proposed local talent development plan?
- (If applicable) If the applicant is **outsourcing/collaborating with Malaysian incorporated companies and/or universities/research institutions**
  - Contribution is impactful and significant to the ecosystem development?
  - Justifications for not outsourcing/collaborating with Malaysian incorporated entities valid and acceptable. Applicant has laid out plans to develop the ecosystem to address the ecosystem gaps.

II. Commercial merit

- **Market** – target market and its market size as well as annual growth defined. Applicant demonstrated can achieve a realistic potential market share.
- **Competitive** – does the applicant have a defensible market position? What other businesses are in competition with this project which are not identified?

- **Revenue** – demonstrated a realistic, scalable business/revenue model that can achieve explosive growth. Defined clear identifiable revenue streams with good gross/net margins.
- **Proven model** – demonstrated market validation of market's acceptance of the proposed product/service.
- **Sales & marketing expertise** with proven track record to achieve sales target has been adequately identified.
- **Proposed strategies (including COE if applicable), plans, approaches, and activities** – impactful, significant, sustainable to the growth of Malaysian economy, brings catalytic impact to the ecosystem, creates economic spillover.
- **Benefits derived from the project** are credible, realistic and impactful and benefiting Malaysians and Malaysia. Proposed long-term plan demonstrated the applicant's long-term commitment in Malaysia.

III. Value for money

- **Proposed targets for KPIs** are stretched and is value for money for the requested grant amount. Is the projected ROI low, reasonable, or high?
- **Integrity in cost estimates.** Are the cost estimates reasonable and justifiable?
- How healthy is the company's financial standing?
- Demonstrated evidence of **financial management capabilities**
- Adequately addressed the **source of funding for this project.** If the source of funding is from a 3rd party, the company has provided adequate evidence.

Global Innovation Fund

The Global Innovation Fund (GIF) invests in the development, rigorous testing, and scaling of innovations targeted at improving the lives of the world's poorest people. Through grants and risk capital, the Fund helps breakthrough solutions to global development challenges from for-profit firms, non-profit organisations, researchers, and government agencies to maximise their impact and affect meaningful change.

Through grants, loans (including convertible debt) and equity investments ranging from $50,000 to $15 million, we back innovations with the potential for social impact at a large scale, whether they are new technologies, business models, policy practices, technologies or behavioural insights.

The Fund supports innovators at all stages of their life cycle, from start-up and pilot-testing through to larger scale implementation. The innovations funded can be located in any developing country and can focus on any sector relevant to international development, provided they improve the lives of those living on less than $5 a day.

GIF takes a venture capital approach, using a tiered financing model, and offering graduated funding. The goal of staged funding approach is not to fund small organisations that stay small, and medium-sized interventions that stay medium-sized. It is to support organisations to scale up to reach millions of people.

This staged funding approach also allows GIF to manage risk sensibly. The fund is able to take smaller bets on riskier, unproven innovations at the pilot stage, and is able to invest larger amounts in innovations that have demonstrated strong evidence of success, through rigorous impact evaluations where possible. By meeting the financing needs of innovators from the seed stage right through to expansion funding, GIF aims to transform high potential ideas into impact at scale.

For more information, access:
https://www.globalinnovation.fund

National Internet of Things (IoT) Strategic Roadmap of Malaysia

The Malaysian Administrative Modernization and Management Planning Unit, Government of Malaysia, Malaysia

https://www.malaysia.gov.my/

The Internet of Things (IoT) technology is an evolution of Internet technology where objects (things) are capable of sending data using devices via the Internet to generate information and new knowledge, which then give added value in enhancing productivity and quality of life.

Background

Gartner, a leading consultation and research company in ICT, predicted that the IoT technology will generate economic opportunities of RM890 billion globally and increasing in value to RM6,100 billion by 2020. It is estimated that the IoT will grow at a rate of 34.1% per annum in the Asia Pacific region to RM203 billion by 2020.

Malaysia is at an excellent position to seize the economic opportunities generated by the IoT. The broadband Internet and cellular penetration rate is at 67.8% and 145%, respectively; established Electric and Electronics (E&E) and telecommunication sectors, strong foundations of Small and Medium-sized Enterprises (SME); and implementation of various Governmental innovation initiatives will become the basis in facilitating the implementation of IoT initiatives.

Problem Statement

The major constraints that impede the growth of the national IoT industry are the lack of a comprehensive IoT ecosystem, no standardization in technologies of the present-day IoT components and concerns on the level of security and privacy in the country.

Objectives

The National IoT Roadmap aims to realize the vision of Malaysia as the Premier Regional IoT development hub with the mission of creating a national ecosystem to enable the proliferation of use and industrialization of Iot as a new source of growth for the national economy. The IoT industry is expected to contribute RM9.5 billion to the gross national income of Malaysia by 2020 and RM42.5 billion by 2025;

There are three main goals for the implementation of the National IoT Strategic Roadmap:

(i) Create a conducive IoT industry ecosystem to stimulate the smooth implementation of IoT technology

(ii) Strengthen technopreneur abilities and capabilities in Apps and services development based on IoT technology

(iii) Develop Malaysia as the Premier Regional IoT Development Hub

Strategies

In order to ensure the targeted objectives can be fully achieved, this roadmap defines five strategies which are:

(i) Create capability and ability enhancement programs for local SME technopreneur companies through exposure to IoT technology, brainstorming sessions, and scheduled experience-sharing sessions

(ii) Implement pilot projects in line with the various existing national initiatives and to be made as development and implementation model for the IoT technology

(iii) Establish "IoT Malaysia," as Community of Practice, which consists of stakeholders in the IoT-based industry, with the aim of enhancing industry performance, developing human capital, and to act as agent in promoting the IoT ecosystem

(iv) Develop an Open Innovation Framework to standardize differences in IoT technology through development of technological components, and thus strengthening the competitiveness of local technopreneurs by minimizing the complexities of technology and boosting innovation based on a heterogeneous system

(v) Organize and develop an IoT Open Community Data Framework to facilitate information sharing between industries and users towards enhancing the quality of life and well-being of society.

Outcome/Impact

This roadmap plan is in line with existing policies and initiatives such as the National ICT Strategic Roadmap (2012–2020), Digital Malaysia initiative, Digital Lifestyle Malaysia, and Industry4WRD 2018-2025, and delivers positive contribution to Malaysia's economic development.

Achievement

To-date, there are more than 100 IoT solution applications developed by Malaysian technopreneurs; and they are being used or adopted by the public and private sectors across various fields including agriculture, transport, and the retail business.

Statistics

There are more than 15 centers that provide technical support to the public and private sectors in support of IoT development in Malaysia.

Innovation Lab – Changing the scenario in Bangladesh

Access to Information (a2i) Programme, Bangladesh

https://a2i.gov.bd/innovation-lab/

Fostering a hands-on, action-oriented approach to tackling the biggest challenges faced by society and people (in issues like employment, disability rights, and agriculture), laying a strong foundation for some of the brightest minds to come together and collaborate for devising some of the most innovative solutions in the country.

Access to Information (a2i) Programme

Access to Information (a2i) Programme of Bangladesh strives to unfold the true potential within the government to create remarkable innovations that can ease and improve the lives of citizens. As the flagship programme of the Digital Bangladesh agenda, a2i inspires public service innovation and transformation by sharing groundbreaking insights supported by examples, lessons, and knowledge.

Innovators are faced with significant challenges

A tech-based start-up wanted to design a technology that allowed students to access multimedia content in communities still off the electricity grid. A local nonprofit social development organization, working with disability rights, wanted to convert national curriculum text books available in Bangla into accessible education content for visually impaired children and slow learners. A government entity wanted to automate the system for applying for and receiving environment clearance certificate. And a local innovator with his team wanted to develop their own version of 3D printers that could manufacture artificial limbs and any small scale prototype at much less time and cost than their foreign counterparts.

These innovative ideas faced a few common obstacles –

1. The innovators did not have the funds to develop complete prototypes
2. They could not test the efficacy of the prototypes with real users or beneficiaries.

Service Innovation Fund as solution to these challenges

a2i's Service Innovation Fund (SIF) was designed to address these challenges. It provides seed funds and incubates cost-effective, user-centric, home-grown innovations to solve some of the most important problems affecting undeserved communities.

SIF also sets itself apart from other "innovation funds" by:

- Co-investing with the innovators in bringing their ideas to life
- Providing mentorship support and access to citizen-beneficiaries to refine the prototypes and make them more user-centric
- Supporting innovators through liaising with relevant partners from both the public and private sectors for effective project implementation, successful scale up, and sustainability

To date, SIF has attracted 3,835+ innovative proposals, using an online platform called Idea Bank and granted over a quarter million dollars to government agencies, development organizations, nongovernmental organizations (NGOs), academic institutions, private companies, and even individuals.

Whole-of-society doing development innovation

As a result, Bangladesh now has solar-powered multimedia classrooms being setup in all off-grid locations; DAISY standard multimedia talking books for use by visually impaired students and slow learners covering education content for classes 1 through 8; an online application system for Environment Clearance Certificate; and a 3D printer which has already been used to print artificial limbs for disabled children whose parents are too poor to afford conventional prosthetics.

WIPO GREEN – The Marketplace for Sustainable Technology

WIPO GREEN is an online platform for technology exchange. It supports global efforts to address climate change by connecting providers and seekers of environmentally friendly technologies. Through its database, network and acceleration projects, it brings together key players to catalyze green technology innovation and diffusion.

For more information, access:

https://www3.wipo.int/wipogreen/en/

Alternative energy in Thailand

Thailand Board of Investment, Thailand
https://www.boi.go.th

In order to strengthen Thailand's long-term energy security and global economic competitiveness the country has committed itself to develop its alternative energy capabilities. This policy emerged at the national level as the Alternative Energy and Development Plan (AEDP), a 10-year initiative (2012–2021) to better diversify and build a more sustainable energy sector. With this plan, Thailand has set the target of increasing alternative energy consumption from 9,025 ktoe (kilo tons of oil equivalent) in 2014 to 24,638 ktoe in 2021. The Department of Alternative Energy and Development and Efficiency has been assigned to oversee alternative and renewable energy improvement.

According to the Energy Policy and Planning Office, Ministry of Energy, Thailand used the equivalent of 2 million barrels of oil per day in 2014. Furthermore, the sector is heavily reliant on foreign inputs considering over half (57%) of that energy is imported. Total energy expenditure in 2014 was US$66 billion, 1.87% higher than in 2013. The largest energy consumers in 2014 are the industrial (using 37.1% of total energy) and transportation (using 35.4% of total energy) sectors.

In general, the major source of power generation in Thailand comes from natural gas, contributing to 66% of the total share in 2014. The other significant sources are coal and lignite which make up 21% of the share. Renewable energy currently only represents 3% of the power produced in Thailand. However, according to the AEDP initiative, this will be increased considerably in the coming years. This will be further explained in the following section.

The Renewable and Alternative Energy Development Plan (AEDP), 2012–2021

It is expected that the energy demand in Thailand will continue to rise. As previously mentioned, Thailand's commercial energy consumption in 2014 averaged 2 million barrels of oil per day; this is a 2.5% increase from the previous year. Furthermore, the government projection as stated in the AEDP plan, estimates the energy demand in 2021 will reach 99,838 ktoe, a 47% increase from the 2014 level which was 68,101 ktoe.

More importantly, the government plans to reduce Thailand's reliance on foreign energy import that accounted for more than 57% of the primary commercial energy demand in 2014. Thailand's oil sector was even more reliant on imports, reaching 85% of total domestic oil consumption. In an effort to cut down on these dependencies and increase energy security the AEDP initiative was formed.

The end goal of the AEDP is to achieve 25% reliance on total national energy generation from alternative or renewable sources by the year 2021 and to set the country's societal development on a path towards a low-carbon usage base, away from fossil fuels. The breakdown of the sources is: solar, wind, hydro-power, bio-energy (biomass, bio-gas, MSW), biofuels (ethanol, biodiesel, new alternative diesel fuel), and new energy sources (tidal, geothermal).

The main focus of the plan is on solar and bio-energy because of the suitability and ease of production for these energy sources in Thailand. The country's tropical location makes it an ideal place for the development of solar energy as the country receives a large amount of solar radiation throughout the year. As for bio-energy, Thailand's economy is heavily based on agriculture, leading to the production of large amounts of agriculture and municipal waste that could be converted into usable energy.

The Ministry of Energy established a roadmap as a strategy to promote the Alternative Energy Development Plan through the following six strategic initiatives:

1. Promoting community collaboration in the broadening of production and consumption of renewable energy.
2. Adjusting the incentive measures to promote stronger investment from the private sector.
3. Amending the laws and regulations that do not benefit renewable energy development.
4. Improving the infrastructure system of transmission lines, power distribution lines, and including the development of a Smart Grid System.
5. Improving public relations and building up public awareness and understanding.
6. Promoting research as a mechanism for the development of a holistic alternative energy industry.

Green Central Asia

The aim of Green Central Asia is to improve access to information and risk analyses to enable participating countries to assess the impact of climate change more accurately and to take preventive measures. At the same time, dialogues and workshops are meant to increase the partner states´ resilience and decision-makers' ability to adequately address security hazards resulting from climate change at national and regional level. The target group of the Initiative consists of the foreign ministries (and, through them, the respective institutions responsible for climate and environmental resources, including educational and research institutions) of Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan as well as Afghanistan.

For more information, access:
http://greencentralasia.org/

Clean energy promotion in Sri Lanka

Ceylon Electricity Board, Sri Lanka
https://ceb.lk/

Sri Lankan scenario

Sri Lanka is blessed with the renewable energy sources which can be utilized to fulfill energy requirements of the country. Ceylon Electricity Board (CEB) as a power utility of the country has promoted generation of electricity using Renewable Energy Resources since early 1990s by giving the required assistance to the private sector, which includes training & capacity building, pre-feasibility studies, and resource assessments. The procedure for electricity purchases from small renewable energy producers (SPPs) by the CEB was regularized beginning 1997 with the publication of a standardized power purchase agreement (SPPA) which included a scheme for calculating the purchase price based on the avoided cost principle. This was offered to all sources of power plants of capacity less than 10 MW.

Moreover, the government has identified the development of Renewable Energy Projects, as a matter of policy to diversify the electricity sector from high-cost thermal power generation. Therefore, required incentives and assistance was provided for the renewable energy resource development (Mini Hydro, Biomass, Wind, etc.). Further, National Energy Policy 2006 has identified fuel diversify and energy security in electricity generation as a strategic objective and development of renewable energy projects was identified as a part of this strategy. Action has been taken to introduce a cost-based, technology-specific, three-tier tariff instead of avoided cost-based tariff with effect from year 2007.

Non-conventional renewable energy

The government of Sri Lanka has identified the development of Renewable Energy Projects, as a matter of policy to diversify the electricity sector from high-cost thermal power generation. Therefore, required incentives and assistance was provided for the renewable energy resource development (Mini Hydro, Bio Mass, Wind, etc.). Further National Energy Policy 2006 has identified fuel diversify and energy security in electricity generation as a strategic objective and development of renewable energy projects was identified as a part of this strategy. In view of above action has been taken to introduce a cost-based, technology-specific, three-tier tariff instead of avoided cost-based tariff with effect from year 2007.

Cost-based, technology-specific NCRE tariff

The cost-based approach of determining tariffs for NCRE power plants is commonly used in many countries. The tariff that is computed using this method, allows a project developer to cover its O&M and capital costs. Besides, it ensures an assured return on capital.

This method analyses the cash flows as a result of the project activity with return on equity as one of the components of cash outflow and estimates annual cost of generation. There are some variations in the application of this method. The tariff can be given in tiers where in the initial years (typically the loan repayment period), the tariff given is higher and then lower tariff is given for the subsequent periods, which covers the operational costs and the return on the investment. The cost escalations, the O&M escalation, fuel cost escalation, and incentives in terms of subsidy or other fiscal incentives can also be included while estimating tariffs by this method. The tariff calculated by this method varies from technology to technology depending upon the performance and costs. Moreover, the tariff estimation by this method solely depends on the cost and performance of the project/technology.

In the cost-based approach, ideally tariff should be estimated for each project. However, due to resource and time constraints, technology benchmarking is commonly used wherein the average parameters such as the plant factor and, capital costs, are used for estimation of tariff. Cost-based, technology-specific NCRE Tariff effective from 01/01/2012 until further notice.

National energy policy

Sri Lanka has achieved several goals set in the National Energy Policy and Strategies (2008) in the completion of electrification and the development of the renewable energy sector on the island.

The importance of enhancing self-reliance and the continuous development of the renewable energy sector in Sri Lanka is also emphasized as a part of the Ten Pillars of the National Energy Policy (2019).

BANGLADESH

Manufacturing plant of activated carbon

A leading manufacturing company in Bangladesh is planning to set up a manufacturing plant of activated carbon and precipitated silica from rice husk ash.

Area of Application
Activated Carbon, Precipitated silica, Rice husk ash

Environmental Aspects
Systems integration

Development Status
Pilot plant, Fully commercialized

Transfer Terms
Consultancy, Technical services

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GERMANY

Energy from biomass

In the preparation and processing of natural products such as in the textile, paper, food, and wood and furniture industries, waste accumulates. These wastes have comparatively high heating value and by using an advanced firing technology they can substitute fossil fuels. In the case of regenerative energy sources such as reeds, grass, fast-growing trees, and bushes biomass can be used as a fuel. The German company which is offering the technology is a market-leading manufacturer with worldwide experience in individual design and construction of more than 100 steam and heating generators using biomass as fuel. The company has set up plants up to 20 MW thermal outputs. It has an engineering office in Singapore. The company provides the following technologies: Biomass fired boilers (shell and water tube boilers, heat transfer equipment); Combustion systems (multiphase: drying, degasification, ignition, and burnout); Firing systems (optional): underfeed stoker firing up to 5 MW; grate firing with outputs of over 70 t/h; cyclone firing combustion chambers; auxiliary firing in the case of intermittent supplies of biomass or waste; Co-generation system to generate electricity; Filter technologies to separate dust in flue gas. The technology supplier is interested in a strong co-operation with manufacturers of boilers, biomass to energy and co-generation plants, industrial heating systems. The companies should have very good market accessibility (local and preferably other Asian countries) and a technical service organization.

Area of Application
Energy generation, biomass utilization

Advantages
Highly economical source of energy, energy from waste/biomass: various agricultural wastes and industrial wastes (biogases, bark, cotton seeds, peanut shells, flax waste, cocoa bean shells, coconut shells, corn cobs, rice husk, coffee bean shells, sunflower husk, palm fibers, sawdust, paper wastes, palm oil leftovers) can be used as raw materials; Innovative technologies; Excellent design; Long-lasting efficiency; Safety guarantee; Allows complete customized plants.

Environmental Aspects
Waste utilization, Energy efficiency

Development Status
Fully Commercialized

Transfer Terms
Consultancy, Joint venture, Technology licensing

Contact
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HUNGARY

Wireless sensor networking

Our partner, a Hungarian University has developed a new wireless mesh networking technology that is suitable for an array of applications from smart metering purposes to environmental monitoring, medical sensors, or automatization. They are interested in a sales agreement, a license agreement, or a joint venture opportunity. Background information: Wireless mesh networking solutions have many Advantages in flexibility over wired solutions, but they also have different technological challenges. For example, in smart metering, most solutions use wired Power Line Communication, which needs an infrastructure and fix placement. However wireless solutions are completely mobile, can be installed freely, but their communication should be protected against interception and manipulation of transmitted data. This is an issue also in wired technologies. Mobility also draws the question of power source, which is usually a battery that needs to be replaced over time, so energy efficiency is a key factor. Another important question is visibility of wireless nodes, which is determined mainly by the frequency, and transmission power used. The frequency affects transmission range and throughput, signal-noise ratio and penetration. The invention is a wireless mesh networking technology suitable for an array of applications from smart metering purposes to environmental monitoring, medical sensors, or automatization. The protocol uses industry standard secured multi-hop channels to propagate information to the server. Energy efficiency is a key factor in the protocol of technology; the devices remain in sleep mode as much as possible to maximize battery life, which can be measured in years.

Area of Application
- Environmental monitoring
- Medical sensors
- Automatization
- Smart metering

Technology Offers

Advantages

- At 433 MHz, the technology is available in every major trading nation of the world. At 2.4 GHz ZigBee has the benefit of being available in all nations but at the cost of using a frequency that is crowded, unreliable, short-range, and has limited ability to penetrate walls, concrete and water.
- The technology is designed to provide long battery life and low device cost for bursty, asynchronous applications that require multi-year battery life. ZigBee's focus is on applications that can benefit form high data rate and shorter battery life.
- The devices are in sleep mode for most of the time and only wake as they need to transmit and receive data, so battery life can be measured in years. ZigBee has no RF wakeup and uses a complex scheduling mechanism for communication and more energy to transmit at higher bandwidths.
- The technology has six times the range of ZigBee, and the ability to penetrate concrete and water as the benefits of 433 MHz.

Development Status
Commercial prototype

Legal Protection
Patent

Transfer Terms
Technology licensing, Research partnerships

Target Countries
Worldwide

Transdermal medical gas delivery technology

The technology is capable of delivering all kinds of noble and medical gases through non-invasive means. The company's first application of this technology is with CO_2 gas. The physiological change with dry CO_2 balneotherapy naturally occurs in the human body when CO_2 is delivered into the microcirculation in the skin. In the blood stream CO_2 enables hemoglobin in red blood cells to release more oxygen and automatically deliver the O_2 to tissues where the body needs it. This well-known and studied naturally occurring process was discovered in 1908 by Christian Bohr (the father of the 1922 Nobel Prize winner quantum physicist Niels Bohr) and it is called the Bohr effect. The delivery of medical gases is used for treating high blood pressure, non-healing wounds such as critical limb ischemia, and other arthritic and micro circulatory conditions. Innovation of the technology: Core technology—a non-invasive transdermal medical gas delivery technology—developed by the company is not a single product, but rather a broad technology and business platform upon which several product lines, markets, and business opportunities are being developed. In comparison with conventional balneotherapy, this is the only portable device on the market.

Area of Application

- Spas, skin care and wellness centers, bath houses, and alternative treatment centers, with limited therapeutic claims
- Medical clinics, home healthcare service providers, nursing homes, elder care centers, retirement homes, etc., with targeted medical claims.
- Mass end user market, targeted medical claims.
- Sport centers, teams, sport medical centers and sports-related service providers, with targeted medical claims.
- Veterinary products, professional veterinary and home veterinary markets with targeted medical claims.

Advantages
The technology is completely mechanical and no electricity is needed for operation, has no moving parts and therefore requires almost no maintenance. The device provides treatment at the point of care (effected body parts) or full body treatment. It is small (size of a shoe box) and portable, completely safe and user-friendly. It is fast, requiring only about 3 minutes for preparation for a first-time user and 20 minutes for the treatment. Absolutely no training or special knowledge is needed to operate it. The technology has "instant" measurable health effects after the first treatment. It costs quarter of the price of rival technologies.

Development Status
Commercial Prototype

Transfer Terms
Technology licensing, Research partnerships

Target Countries
Worldwide

For the above two offers, Contact
Laser Consult Ltd (Hungary)
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Szeged
Hungary

Transducer matrix application in biosensors

The principal objective of the present invention is to provide a process for the synthesis of nanostructured conducting polymer (NSCPs) by using structure directing agents. • In addition, this invention also provides a process to develop a nanostructured conducting polymer with high electrical conductivity. • Another objective of the present invention is to use the synthesized nanostructured conducting polymers as a transduction matrice for the development of biosensor. • Yet another objective of the present invention is to provide a method for the development of optical biosensor by using synthesized nanostructured conducting polymers as a transduction matrice • Last, but not the least, this invention also intends to provide an optical biosensor having possible application in the testing of biological samples. • High Surface Area of nanostructured conducting polymer-enhancing enzyme loading • Bio-compatibility • Dimensional compatibility with biomolecules. • Film forming ability

INDIA

Area of Application
An optical glucose biosensor has a potential application in the testing of biological samples.

Environmental Aspects
Bio-degradable and environmentally friendly

Development Status
Laboratory model

Legal Protection
Patent

Transfer Terms
Consultancy, Technical services, Technology licensing

Solvent tolerant bacterial lipase

We could offer a technology to synthesize bacterial lipase that has potential applications in the food industry. Brief description of the process/product/technology developed- se to various polar and non-polar organic solvents for 2 h elucidates that the enzyme was stable to all organic solvents tested. The highest relative activity was achieved with chloroform (400%) followed by toluene (250%) and 1-The present invention provides an extracellular bacterial lipase from Pseudomonas mendocina M-37 (MTCC 7054) with high stability and substrate specificity. The bacteria were isolated from oil industry effluent showing high activity on olive oil. The substrate specificity of Pseudomonas mendocina M-37 lipase shows that the lipase was especially more active towards the synthetic triglycerides and fatty acids esters that possesses butyryl group like benzyl butyrate (1,120% relative activity), tributyrin (744%), and amyl butyrate (550%), respectively. The stability of lipase in organic solvents offers Advantages for ester synthesis. Exposure of M-37 lipaoctanol (215%).

Area of Application
The bacterial lipase showing high activity in organic solvents and substrate specificity for butyrated esters has possible significant applications in food industry for ester synthesis. The esterification reactions in food industry are carried out in organic solvents and uses butyrated substrates. Pseudomonas mendocina lipase has possible applications in synthesis of flavor and fragrance esters; for organic synthesis and modification of fats and oils.

Advantages
Pseudomonas mendocina lipase possessing high stability in organic solvents, high substrate specificity mainly for butyrated esters has possible significant applications in food industry for ester synthesis.

Environmental Aspects
Bio-degradable and environmentally friendly

Development Status
Laboratory model

Legal Protection
Patent

Transfer Terms
Consultancy, Technical services, Technology licensing

For the above two offers, Contact
Amity University Uttar Pradesh Sector-125, Noida
Distt Gautam Buddha Nagar 201303
India

Nano gold-loaded carbon bullets as gene carriers

Scientists have developed a process for the preparation of carbon embedded nano gold particles with sharp edges which can be used as gene carriers. The bullets are sharp enough to penetrate hard material, with less damage (a comparatively lower force of 0.1–0.2 nN required for penetration) and can be delivered with a convenient delivery gun. Intracellular gold particles (biogenic) synthesized by a fungus *in situ*, embedded on a carbonaceous matrix.

Area of Application
- Gene therapy/ improved gene delivery for research and other applications? Potential applications
- DNA-based immunization, to study gene function and its regulation, to establish various disease models, metal ion removal, fuel cells, antibacterial applications, catalysis

Advantages
- Preparation process is very simple and easy to implement
- The carbon matrix forms 95% of the carrier reducing the amount of gold needed and the plasmid used per transformation
- Advantages of usage of gold particles- High DNA packing density, better transformation efficiency, low nuclease degradation, being in nano scale, higher surface area is obtained-more gene cargo handled
- Advantages of usage of carbon support- Inert and less damage causing- wound caused due to penetration healed faster, better piercing capacity, for example, can effectively pierce hard plant cell walls, less force required to penetrate the plasma membrane as compared to silver nano needles

Development Status
Laboratory model

Legal Protection
Patent

Transfer Terms
Technology licensing

Contact
National Chemical Laboratory, CSIR
A208, PAML Building, National Chemical Laboratory Dr Homi Bhabha Road,
Pune 411007
India

Technology Offers

Waste plastics into industrial fuel

We offer plants for converting non-recyclable waste plastics into industrial fuel. Fuel quality far superior to the conventional industrial fuels such as furnace oil or light diesel oil. ALL types of plastics can be processed. We can also supply technology. Serious customers can get their waste plastics tested on our Demo Plant Plants as small as 1 TPD of plastics up to 30 TPD can be supplied..

Area of Application
Converting waste plastics (non-recyclable cheap plastic scrap) into industrial fuel.

Advantages
Disposal of non-recyclable waste plastics keeps environment clean, gets excellent monetary returns, for the industries that have their own plastic scrap generation can generate fuel at a very low price.

Environmental Aspects
Cleaner production, Waste utilization, Energy efficiency, Systems integration

Development Status
Pilot plant, Commercial prototype

Legal Protection
Trade Mark, Patent

Technical Specifications
Plants having capacity as low as 1 TPD of plastics offered. No upper limit on higher capacities.

Transfer Terms
Consultancy, Joint venture, Technology licensing, Turnkey

Contact
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New method for bioimplants

The technology provides novel titanium (Ti)-based composite bioactive (biocompatible) material useful as prosthetic implant as against conventional processes wherein the bioactive phases, usually calcium phosphatic chemicals, are present on the surface of the bioinert Ti.

Area of Application
Medical industry

Advantages
Uniform and higher strength throughout the composite biocomposite allows the growth of bone substitute material from the body fluids

Development Status
Laboratory model

Legal Protection
Patent

Transfer Terms
Technology licensing

Contact
SkyQuest Technology Consulting Pvt. Ltd.
501, Krishna Complex, Opp. Devashish School, Bodakdev
Ahmedabad 380054
India

THAILAND

Automation system with robot

Our Company, with full design (including CAD), engineering, production, installation, and service facilities, is specialized in all types of: 1. Industry Machine and Material handling System. 2. Automation System with Robotic. 3. Services and maintenance or Retrofit industry machine. 4. R&D in other fields support (such as Environment and Energy saving). 5. Furthermore with Biotechnology and Nanotechnology with expert engineer team.

Area of Application
Machinery industry, Material handling industry, Automation system, Robotic industry, Retrofit, Environment

Advantages
1. Very efficiency process compares with convention process;
2. Economical process;
3. High performance machine;
4. Environment and Energy Saving;
5. Expert Engineering Design;
6. Not expensive;
7. qualification by ISO 9001:2000

Environmental Aspects
Cleaner production, Waste utilization, Energy efficiency, Systems integration, Not Applicable, Remediation of environment

Development Status
Idea, Design, Laboratory model, Pilot plant, Commercial prototype, Fully commercialized

Legal Protection
Trade Mark, Patent, Technology license, Copyright

Technical Specifications
Expert Engineering team and ISO9001:2000

Transfer Terms
Consultancy, Subcontracting, Joint venture, Technical services, Technology licensing, Equipment Supply, Turnkey

Contact
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1 moo 10 Soi Watmahawong,
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Thailand 10130

Selected Analytical Reports and Technology Platforms & Databases of APCTT

Analytical Reports (available online)

1. National Assessment Framework on Enabling Environment, Technology Innovation Ecosystem for Making Sustainable Energy Options Affordable and Accessible (For Indonesia and Lao People's Democratic Republic), January 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/National-assessment-framework_-final_ESCAP.pdf

2. Report on the National Assessment Framework of Enabling Environment and Technology Innovation Eco-system for Making Sustainable Energy Options Affordable and Accessible – Indonesia, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Indonesia_Report-on-National-Assessment-of-Sustainable-Energy_optimized.pdf

3. Indonesia National Sustainable Energy Strategy Report on Enabling Environment and Technology Innovation Ecosystem for Affordable Sustainable Energy Options, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Indonesia-National-Strategy-Report_final.pdf

4. Report on the National Assessment Framework of Enabling Environment and Technology Innovation Ecosystem for Making Sustainable Energy Options Affordable and Accessible - LAO PDR, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Lao_Report-on-National-Assessment-of-Sustainable-Energy.pdf

5. Lao People's Democratic Republic National Sustainable Energy Strategy Report on Enabling Environment and Technology Innovation Ecosystem for Affordable Sustainable Energy Options, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Lao-National-Strategy-Report_final.pdf

6. National Innovation System (NIS) training manual - "NIS Diagnosis and STI Strategy Development to Achieve National Sustainable Development Goals", 2016

   http://apctt.org/nis/sites/all/themes/nis/pdf/NIS%20Training%20Manual.pdf

Technology Platforms and Databases

1. APCTT's Technology4SME Database

   The Technology4SME Database serves as an online platform for information exchange on the availability and sourcing of technologies for small and medium enterprises in countries in the Asia Pacific region.

   http://apctt.org/technology-transfer

2. Renewable Energy Technology Bank

   The primary objective of the Renewable Energy Cooperation-Network for the Asia Pacific (RECAP) established by APCTT is to facilitate technology transfer cooperation among countries in the Asia-Pacific region in the area of renewable energy. RET-Bank provides tested and proven renewable energy technologies (RETs) initially in the areas of solar, biomass, wind, mini-hydro power and geo-thermal energy.

   http://apctt.org/recap/renewable-energy-technology-bank

3. Global Technology Databases

   APCTT has compiled a list of global as well as country-wise technology databases that deal with the technology transfer related services for SMEs and entrepreneurs.

   http://apctt.org/aptitude/