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APEC Capacity Building Workshop on Promoting Digital Economy

APEC Committee on Trade and Investment

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Ha Noi, Viet Nam | 21 – 22 October 2021

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Contents

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Summary Report

I. Introduction

On 21 and 22 October 2021, the APEC Capacity Building Workshop on Promoting Digital Economy, initiated by Viet Nam and co-sponsored by Canada; Chile; Indonesia; Japan; Malaysia; Russia; and Papua New Guinea was held both physically in Ha Noi, Viet Nam for local participants and virtually for foreign speakers and participants due to the COVID 19 impacts. Speakers and participants came from private sector, business associations, international organizations and research institutions and APEC member economies' relevant Ministries and government's agencies.

The APEC Capacity Building Workshop on Promoting Digital Economy aims at the following objectives:

- Promoting a better understanding on digital economy, its current state, its roles and impacts, challenges, and opportunities, as well as how to transform from potentials into practice;
- Examining how institutions, policies, and regulations can be approached and transformed to keep up with the digital transformation for the sustainable connectivity and growth;
- Share views and experiences on how to support MSMEs in taking advantages of digital economy in various aspects, namely a few: e-commerce, financial technology, innovation, etc.

II. Background

It is widely acknowledged nowadays that human being is on the brink of the revolution 4.0. Technological revolution will fundamentally alter the way we live, work, and relate to one another. In this 4.0 revolution, these technologies combine the physical, digital, and biological worlds and will impact all disciplines, economies, and industries, and even challenge our ideas about what it means to be human.

The digital economy, considered as an inevitable and trendy outcome of the 4.0 revolution, are having great impacts on changing how people interact; how consumers shop; how

products and services are designed, developed, marketed, and delivered; and how businesses operate and interact with one another. It encompasses both opportunities and challenges though it might be expected that the former will overwhelm the latter and people are on the way to be prepared for the digital economy. However, potentials can be realized into practice only when adequate infrastructure, supportive policies at domestic and international levels are in place, and governments and all segments of the economy: business community, people, etc…are ready for it.

In this line, sharing experiences and capacity building are considered as one of important means to support the stakeholders in taking advantages of the digital economy.

This project focus on providing capacity building to promote digital economy through aiming at governments' officials who plays important roles in developing adequate infrastructure and supportive policies. In addition, it will also target to business people who are either involved or serve as facilitators to the digital economy. Through targeting at most relevant and important stakeholders in digital economy, the project will contribute to improve the awareness and capacity for the member economies in taking advantages of digital economy for the sustainable growth and development.

The project is in line with the 2017 Leaders' Statements: "We will work together to realize the potential of the internet and digital economy, including through appropriate regulatory and policy frameworks, and taking into account fair competition to encourage investment and innovation. We welcome the adoption of the APEC Internet and Digital Economy Roadmap" and affirm that "We commit to strengthen the ability of MSMEs to compete in international markets and participate in global value chains through enhancing MSMEs digital capabilities, competitiveness and resilience".

Also, under the Committee on Trade and Investment's (CTI) work on deepening Regional Economic Integration (REI), CTI has been discussing and implementing issues related to digital trade and e-commerce including promotion of cross border e-commerce as well as implementation of the APEC Blueprints 2015. Since this project directly contributes to provide capacity building on promoting digital trade for member economies, it is aligned with CTI's priorities and workplan.

This project also contributes to the implementation of the APEC Internet and Digital Economy Roadmap. Since the project aims to support participants to understand in-depth the digital economy and how the governments can harness their roles to turn potentials into success in various aspects such as policies/regulations, infrastructure, technologies, etc., it helps to address the issue of "*Development of holistic government policy frameworks for the Internet and Digital economy*" in the Roadmap. Additionally, it also helps address "enhancing inclusiveness of Internet and Digital Economy" through focusing on facilitating MSMEs to benefit further from digital economy.

III. Key Issues

1. Digital economy – An overview in the APEC region

1.1. Leveraging Big Data for the Post – Covid Economic Recovery in Southeast Asia, presented by Mr Abhineet Kaul, Principal, AlphaBeta, Singapore

One of the key questions is how big data and advanced analytics help governments in the Southeast Asia deliver more effective and efficient services to citizens and businesses in the rise of the COVID-19. Based on the ADB study to identify opportunities to accelerate the recovery stage from COVID-19 in such economies as Cambodia, Indonesia, Myanmar, Philippines and Thailand, there are three stages of COVID-19 response timelines, namely the "Repair" (1st stage); "Recover" (2nd stage); and "Reform" (3rd stage). The application of big data and new technologies is gradually increased from limited focus in the 1st stage of exploring "low hanging fruit" where big data could enhance government delivery in key sector to the 3rd stage when coverage is more expanded, other technological approaches such as blockchain is incorporated.

Technically, big data is a very large internal and external data sets which could be structured, unstructured and a combination of different data types, capture fast and real-time data. Advanced analytics is use of advanced techniques, e.g., sophisticated algorithms, neural networks, to generate insights that would be impossible to gain or would not be achievable at the same speed, scale, or accuracy with conventional methods. It provides backward- and forward-looking perspectives that turn insights into real-time decisions and actions with standardization and codification of methodology in easy-to-use tools or models.

The potential value of big data for government services depends on several influencing drivers. The first driver is volume of data. The larger the amount of data in the sector, the more it indicates the potential to benefit from increasing transparency in terms of data. This depends not only on the volume of potential data, but how much it is currently digitalized. The second driver is variety of data. The more different forms of data available in the sector e.g., social media, video content, structured data, etc., the more potential value there could be in combining these to generate unique insights. Another important consideration is the velocity and veracity of data. The higher the quality or accuracy of the data, the better the potential insights. The fourth driver is value of applications. It refers to the degree to which there are specific applications in that sector that can deliver value.

Based on these drivers, three government-related sectors were found to have a range of big data opportunities which are health, social protection, and education. In health sector, big data can be applied to improve the monitoring of infectious diseases, enhance the prevention and detection of non-communicable diseases, and improve treatment capacity through remote patient monitoring, which is especially meaningful in the wake of the COVID-19. In social protection sector, big data can be used to identify beneficiaries and improve program design, improve program delivery and detecting fraud by replacing or supporting human decision making with algorithms that can flag suspicious correlations such as a person receiving unemployment benefits while filing for a work-related accident. Big data can

also be used to assess program effectiveness by analysing the impacts of social assistance on household behaviors e.g., analysing accounting data to understand activities of businesses, bank transactions, fintech data. In education, big data can be used to identify skills gap, increase graduation rates, and prevent dropouts and provide personalized learning experience.

In that sense, there are possibly five potential big data opportunities identified across these 03 sectors, namely:

- Using data from social media and search engines to analyze COVID-19 activity;
- Using social media data to provide real-time insights on public perceptions on vaccines;
- Using data from social media and search engines to detect the risk of developing non-communicable diseases;
- Strengthening the identification of poor individuals and households using satellite data;
- Analyzing data from online job portals and social networks to identify skills gap.

To derive the value from big data for governments, policy enablers are crucial. Seven policy enablers have been identified for the thrive of big data applications, namely: strategic governance, availability and quality of data, risk mechanisms, human capital, access to relevant technologies, data-driven culture, and ICT infrastructure.

Table 1. Policy recommendations to improve the enabling environment for big data

Policy enabler	***Policy recommendation***	***Economy example***
Strategic governance	1. Designate a digital transformation champion in government	In Thailand, Digital Economy Promotion Agency (DEPA) is working with other government agencies to help them understand big data and enhance data management practices
	2. Establish a multi-stakeholder taskforce	In Indonesia, Pulse Lab Jakarta is a platform involving government, private sector, and academia to explore big data applications that can solve real problems – there is an opportunity to scale up such initiative to establish a multi-stakeholder taskforce on big

		data
Availability and quality of data	3. Create integrated data platform (i.e., “one stop shops”) for open big data	In Singapore, Open Data Resources portal provides access to government data from over 70 public agencies as well as direct developer support
	4. Establish forums to interact and crowd-source data from private sector and citizens	In Mexico, Mexico City aggregated data uploaded by citizens to create an open data platform showing public transport routes
Risk mechanisms	5. Establish data protection frameworks	In the U.S., Health Information Technology for Economic and Clinical Health (HITECH) Act encourages adoption of health information technology and ensures the protection of electronic health records. In Canada, the Privacy Act ensures that the government collects, uses, and discloses personal information according to strict rules that preserve individuals’ right to privacy
	6. Collaborate with international community on common standards and approaches	Singapore joined the APEC Cross Border Privacy Rules (CBPR) System to facilitate exchange of personal data with certified organizations while ensuring secure cross-border transfer of personal data based on common standards. ASEAN is developing an open data dictionary with common standards to share government data to the public
Human capital	7. Provide training for civil servants on data management and analysis skills	Singapore government launched a plan to train 20,000 public servants or 14 percent of the public sector workforce on data science between 2018 and 2023 In Thailand, Digital Economy Promotion Agency (DEPA) is leveraging its newly created Government Big Data Institute (GBDI) to train government officers from different departments on big data skills
Access to	8. Establish mechanisms to	In Bangladesh, Innovation for All (a2i) fund

relevant technologies	crowd-source innovations and technologies	provides financing for low-cost, user-centric, home-grown innovations to solve policy problems
Data driven culture	9. Provide incentive schemes for data-driven decision making	South Africa introduced performance rewards linked to the use of data in decision-making in government
ICT infrastructure	10. Go 100% cloud first for government	Saudi Arabia's Ministry of Communications and Information Technology launched a "Cloud First Policy" which encourages government entities to consider cloud solutions first for every new IT investment – this is expected to provide around 30% cost savings of total cost of ownership.

Table 2. Recommended Actions and Timeframe

Timeframe	***Action***
Immediate (next 12 months)	Designate a digital transformation champion in government Establish a multi-stakeholder taskforce Conduct big data pilots
Next 1-2 years	Create integrated data platforms (i.e., "one stop shops") for open big data, and forums to source data from the private sector Develop data protection frameworks and collaborate with international community on common standards and approaches Provide training for civil servants on data skills Conduct pilots of selected big data applications
Next 3-5 years	Go 100% cloud first Provide incentive schemes for data-driven decision making in government (e.g., performance rewards linked to the use of data in decision making) Establish mechanisms to crowd-source innovations and technologies (e.g., improving public procurement guidelines, establishing regulatory sandboxes)

1.2. APEC Framework for Securing the Digital Economy, presented by Mr Thongchai Sangsiri, Expert, Electronic Transactions Development Agency, Ministry of Digital Economy and Society, Thailand.

APEC has undertaken great efforts to promote the digital economy in the last time with a number of activities and initiatives. One among those is the APEC Internet and Digital Economy Roadmap (AIDER), launched in 2017, which provides a guidance on key areas and action to facilitate technological and policy exchanges, covering a wide range of issues, namely: digital infrastructure; interoperability; universal broadband access; holistic government policy frameworks; coherence and cooperation of regulatory approaches; innovation and adoption of enabling technologies and services; trust and security in the use of ICTs; free flow of information and data while respecting applicable domestic laws and regulation; baseline internet and digital economy measurements; inclusiveness; and e-commerce and advancing.

With a focus to employ the pillar of "enhancing trust and security in the use of ICTs" under the AIDER, Thailand proposed the APEC Framework for Securing the Digital Economy in 2019 which has been developed based on 4 principles:

(i) Awareness: the first step towards better digital security;

(ii) Responsibility: digital security is a shared responsibility;

(iii) Cooperation: cooperation is essential to effectively manage digital security risk; and

(iv) Privacy: privacy protection and digital security should reinforce each other

The Framework also covers 7 strategies, namely: (i) digital security risk management; (ii) develop economy strategies; (iii) resilient critical information infrastructure; (iv) strengthen collaboration; (v) digital user empowerment; (vi) digital security technologies for trust; and (vii) personal data security.

2. Digital economy – opportunities, challenges and impacts on business and social stakeholders

Digital Transformation Concepts Application and Cases on SMEs, presented by Prof. Tzong-Ru Lee, Vice Chairman of International Association for Agricultural Sustainability (IAAS), Chairman of International Agriculture Innovation Conference (IAIC).

With aims of illustrating more clearly the impacts of digital transformation on SMEs, four cases of (i) water heater; (ii) iStaging; (iii) animal clinic case; and (iv) research technology implementation key factors have been used.

In order to enable the digital transformation in business, a dual-mode IT is required. Compared with traditional model, transformation model is different in certain features. While the traditional model aims at stability, creating value in terms of cost & efficiency, with function-oriented design, step-by-step progress and with technology and operation

orientation, the transformation model aims at agility, with user experience design, creating value in terms of profit & customer experience, iterative and incremental development, with business orientation, customer orientation. The traditional model is long-term possession of enterprises while in the transformation model, subscription service is applied.

Case study: Water Heater Case

Part 1. The hair salon rents the water heater monthly with a fixed price. In order to rent the compatible water heater, the company asks the salon to give their data, which will be used to calculate or forecast the volume and the peak hour.

Part 2. The hair salon doesn't rent the water heater monthly, they only need to pay the water they use (based on the volume). By this way, the company will have the data about the water usage from each unit in the salon.

Part 3. Through digitalization process, the data of the volume (how much water needed daily), the peak hour etc. can be used to calculate the number of employee and water usage needed (waste prevention).

There are 05 levels of digital capability, which are level 0 – Initialization, level 1 – Digitalization, level 2 – Integration, level 3 – Automation and level 4 – Intelligentization. At level 0, enterprises are still in the basic phase of digitalization (focus on infrastructure) which is in the water heater case, it is the collection of data from the salon. At level 1, enterprises have individual functional information systems to facilitate operational activities and to collect various operational data. In the water heater case, the company can calculate or forecast the volume and the peak hour to choose the compatible water heater. At level 2, enterprises consolidate workflows with digital tools and share data through effective interfaces or pipelines. In the water heater case, the hardware and the software are integrated. At level 3, based on the data collected by the enterprise, the enterprise can develop and set rules to

Case study: iStaging case

Part 1. House agency needed a lot of furniture to make sample houses. A lot of money and storage spaces are needed.

Part 2. The technology company cooperates with house agency to implement Augmented Reality (AR) and Virtual Reality (VR) to make sample houses. This way leads to success.

Part 3. The technology company joined a competition and won prize from the Paris Bank.

Part 4. The Paris Bank introduces the technology company to their clients, who are the managers of Louis Vuitton and Porsche. Nowadays, AR&VR technology is used in the services of these two brands.

reach automatic response and adjustment to reduce the degree of human intervention. In the water heater case, the machine is modified to be able to detect and measure water usage. At level 4, enterprises integrate different enterprise processes to achieve data fusion, and do optimization analysis and modelling based on different situation to develop the ability to adapt and create enterprise intelligence. In the water heater case, data is collected to calculate the number of employee and water usage needed.

Digital transformation has 05 dimensions which need to be paid attention to. The first dimension is business model transformation. The internal workflow and decision-making capabilities of the enterprise with digital tools (platform) need to be improved to increase efficiency and reduce costs. The digital tools in the iStaging case are the change to digital platform which helps to increase efficiency by using online service which is accessible anywhere and to reduce costs by reducing the sample house cost, transportation cost. The second dimension is operational optimization transformation. New service models, products or channels through digital tools and data are developed such as new way to buy house digitally is provided. When enterprise employees face new challenges, not only are the transformation of technology, work, process are focused, but culture transformation also matters which require employees to adjust their work mentality to adapt to the new changes. Customer experience is of great importance in the transformation. Therefore, understanding of customers through digital tools and provide services that are closer to customers' needs should be strengthened. Last but not least, organization operating mode transformation needs to be adjusted to be suitable with the new business model.

The process of digital transformation consists of 12 stages, which are: Stage 1 – Set up management consensus; Stage 2 – Establish a transformation team; Stage 3 – From customer viewpoint, define the guideline for enterprise; Stage 4 – Build a digital factory for texting; Stage 5 – Test new items repeatedly; Stage 6 – Increase the cooperation between departments; Stage 7 – Cultivate digital culture and digital capabilities within the organization; Stage 8 – Integrate and scale; Stage 9 – Scale the projects that are up to standard; Stage 10 – Enhance core capabilities with digital capabilities; Stage 11 – Integrate existing business through the digital operating model and Stage 12 – Build system & optimize repeatedly.

Challenges of digital transformation can fall into the following categories: economic; institutional; behavioral/psychological; organizational/community; consumers/market; social; technological and infrastructure.

Table 1. Challenges of digital transformation

Categories	Challenges
Economic	High investment, cost, long ROI, etc.
Institutional	Low support, lack of regulatory framework, legal issues etc.

Behavioral/psychological	Lack of awareness, conflict with traditional methods, low trust etc.
Organizational/community	Lack of skills, poor R&D, lack of digital culture etc.
Consumers/market	Poor information, lack of attractiveness, market uncertainty, etc.
Social	Lack of social pressure and social acceptance to digitalization
Technological	Too few demos result, high complexity, compatibility issue, etc.
Infrastructure	Lack of internet network, lack of equipment, lack of facilities, etc.

3. Digital economy from the perspective of technology – opportunities, digital divide, and harnessing with a focus on business

3.1. Features in digital economy development in Viet Nam, presented by Mr Nguyen Hoa, Chairman of Expert Council, FSI, Viet Nam.

The majority of Vietnamese enterprises is reported to be at the start point, using linear economy business method which use raw materials for production, consumption of products then discharges wastes into the environment. The linear economy has the characteristics of low productivity, low competitiveness and causing environment pollution. Throughout the development process, Viet Nam will transform from linear economy to circular economy, sharing economy and digital economy. However, this is not a step-by-step transformation but parallel processes, from linear economy to circular economy, from linear economy to sharing economy and from linear economy to digital economy with the advance and support of the 4.0 Industrial Revolution.

The future digital economy that Viet Nam is aiming to achieve is defined by smart automatic manufacturing, data driven, technologies and products make in Viet Nam, with the target for development of digital economy in Viet Nam is to 2025, the digital economy will contribute 20% to GDP and 30% in 2030. Between the starting point and the targeted finishing point is the gap that Viet Nam need to go through. At this stage, Viet Nam needs to perform the following tasks: (i) develop circular economy, sharing economy parallelly with digital transformation process; (ii) change the production procedures or method of manufacturing by applying digital technologies such as IoT, Cloud, Big Data, AI, Blockchain etc.; (iii) build the digital culture in all economic units. To perform these tasks, policies support is needed to boost Vietnamese technologies development, digital infrastructure development and digital labour force development.

There are main solutions to bridge this gap, such as: apply new modern Vietnamese and international circular technologies and sharing methods parallelly with digital transformation process, develop and apply cyber physical systems (CPS) based on Vietnamese digital core tools and develop Vietnamese digital tools and IT applications for all kind of users (including farmers, cooperatives, SMEs etc.). In terms of digital infrastructure, Viet Nam has certain advantages compared to other developing economies, according to statistics in 2020 from Ministry of Information and Communications (MIC) of Viet Nam, 95% of population is covered with 3G, the mobile broadband connections penetration rate is 64.98% of the population, there is 68.17 million internet users accounting for 70% of the population, mobile subscriptions is 145.8 million, accounting for 150%, smartphone penetration rate accounts for 93% of the population and social media penetration rate is 67% of the population.

According to the MIC, the Government has a 05-year plan from 2021 to 2025 with the aim to achieve 5G coverage to 100% of the population, every citizen has a smart phone to access public services and connect to the internet, 100% of public services reach level 3 and level 4, to 2025, there will be 100,000 technology companies together with the development of expert workforce in research area at universities, institutions. The development of digital economy in Viet Nam will be implemented in all areas, however, with its current conditions, Viet Nam prioritizes 06 areas which are agriculture, trade, tourism, healthcare, education, and social security.

The effectiveness of applying technology in production can be illustrated in agriculture, a major industry in Viet Nam with about 50% of total labour workforce. Digital economy development in agriculture will change the production and sale process significantly with the use of cyber physical systems (CPS), commodity traceability system, blockchain application, e-commerce etc.

To sum up, with the support of digital technology, traditional production and sales have changed significantly. In the digital era, new practices are gradually formed regarding social relations, property ownership, service provision, environmental responsibility, etc. Therefore, a digital culture with comprehensive digital transformation should be built and implemented in each organization and enterprise.

3.2. Reaping the benefits of Industry 4.0 through skills development in high-growth industries in Southeast Asia: Insights from Cambodia, Indonesia, the Philippines, and Viet Nam, presented Ms Genevieve Lim, AlphaBeta, Singapore

Industry 4.0 or the Fourth Industrial Revolution (4IR) has the potential to deliver a range of benefits to ASEAN economies. Various studies have been carried out with key findings of the benefits of 4IR in the areas of productivity, incomes, worker well-being, jobs, and workforce participation. AI technologies could bring about labor productivity gains of 38% to 52% while non-digital sectors such as healthcare could reap up to 3 times the productivity benefits from 4IR, as compared to digital sectors. If low-skill workers learn to perform higher-order tasks that are non-automatable, their real wages could increase by 10% by 2030.

Regarding worker well-being, workplace injuries could fall by 11% with automation, and with more time freed up for higher-order tasks, 4IR adoption could increase job satisfaction levels by 20%. In Indonesia, it has been projected that in all sectors except manufacturing, agriculture and mining, the income effect of 4IR alone could lead to net job gains of 1-7% by 2028. In Viet Nam, all occupations (except agricultural workers) are projected to see net job gains of almost 1.57 million jobs by 2028. Job matching platforms could create an additional employment of 5.8 million workers and a GDP boost of approximately US$ 54 billion across 5 ASEAN economies in 2025. On average, 60% of employers in ASEAN tend to hire freelancers to address skill gaps in the future economy.

This study focused on two selected sectors per economy, with a range of methods to assess 4IR skill gaps and policy priorities including conducting surveys to employers, training institutes, analyzing job portal data and consulting stakeholders in each economy. The sectors selected for each economy are:

Economies	**Sectors**	
Cambodia	Garments	Tourism
Indonesia	F&B processing	Automotive
Philippines	IT-BPO	Electronics
Viet Nam	Agro-processing	Logistics

The study finds out that 4IR has certain impacts on jobs and skills. Though employers understand that 4IR's returns could be significant, some have a weak understanding of it. With the right policy settings, 4IR's job creation potential is large and can outweigh job losses. However, in some sectors, jobs held by women are likely to be disproportionately impacted. 4IR also impact the nature of jobs which will lead to a shift from routine to non-routine and analytical work. In terms of skills, critical thinking, judgement, and numeracy skills are likely to become more important with 4IR. A significant share of the required training will have to take place through both on-the-job and longer professional training.

Training institutes' readiness for 4IR is crucial as they help equip the workforce with apt skills for labor market in the context of 4IR. The results of the study find out that many training institutions generally feel well equipped for 4IR but request more support with capacity-building and funding. Most training institutions report that they engage regularly with employers on skills. There is generally strong alignment between training institutions and employers on the skills needed for 4IR, e.g., in the Philippines, both groups agree that technical skills will be most important, followed by ICT and complex problem-solving skills. However, there are key areas which require attention. First, almost half of all training institutions review and update their curricula less than annually. Second, there is a lower focus on workplace-based training than is seen in in leading international vocational training

programs. Third, while approximately half of the training institutions surveyed provide courses relevant for 4IR, the application of 4IR technologies to facilitate training delivery is mixed. Fourth, while most training institutions are providing career advice to students, fewer are providing information on job market conditions i.e., wages & job prospects in different industries. Fifth, training institutions are more optimistic about the graduates' preparedness for work than employers. And sixth, up to 72% of training institutions struggle to fill student spots due to trainee's inability to differentiate programs and a lack of knowledge of their courses.

In the four economies studied, there is a range of current policies that address 4IR. To stimulate 4IR adoption by firms and workers, Indonesia has a clear roadmap for 4IR adoption – "Making Indonesia 4.0" strategy, Philippines provides strong incentives for student apprenticeships with "JobStart" program, in Cambodia, public-private partnerships on skills are initiated with the skills councils established by Government and industry to jointly identify skill gaps and plan training. However, there is still a lack of policies which bridge 4IR adoption to skills training and there are limited incentives for formal workplace training. Another policy to boost 4IR is to create new flexible qualification pathways, with Viet Nam focusing on STEM in curriculums, elevating STEM in primary education, addressing soft skills in vocational programs and Cambodia focusing on more robust skill-based accreditations. However, lifelong learning models is still weak and there is lack of agility in educational curriculums. Another policy is the building of inclusiveness to extend 4IR benefits to all workers, underserved communities is financially supported, for example TVET scholarships awarded to low-income students in Philippines and employability programs for low-income groups in Indonesia. However, for inclusiveness of all workers to benefit from 4IR, social protection mechanisms for gig economy workers should be more complete.

Challenges in the implementation of these policies are as follows:

- Absence of 4IR strategy. Except in Indonesia, the 4IR strategies have not yet formally been approved, with more effort being focused on identifying the opportunities and challenges of 4IR.
- Lack of coordination. In most of the studied economies, there does not appear to be one shared 4IR roadmap. Coordination between government ministries and different levels of government also appeared limited.
- Low R&D investment. While government financing is somewhat aligned with worker skilling priorities, R&D expenditure appears to be low.
- Weak incentives. The incentives for employers and workers to contribute towards skills development also appear weak in each economy.

Recommendations to boost workers' preparedness for 4IR:

- Develop sector-specific 4IR adoption roadmaps
- Develop a series of industry-led TVET programs for 4IR skills
- Implement an incentive scheme for firms to train employees for 4IR

- Provide support for training institutes to incorporate 4IR technologies into courses
- Strengthen quality assurance mechanisms for training institutions
- Strengthen social protection measures in context of 4IR.

4. Digital government – governments' approaches, preparation, and institutional transformation

4.1. Promoting the Digital Economy – the Canada's Journey to Digital Government, presented by Mr Mark Levene, Lead, Digital Government Partnerships, Digital Change Sector, Office of the Chief Information Officer Treasury Board of Canada Secretariat / Government of Canada

The Government of Canada has set a vision for their management in general and the promotion of digital government, through detailed strategies such as: to be an open and service-oriented organization; operates and delivers programs and services to people and businesses; in simple, modern, and effective ways; to be optimized for digital; and to be available anytime, anywhere and from any device. In that sense, the Digital Operations Strategic Plan (DOSP) 2021-2024 has outlined four key pillars to support the application of digital government, including: (i) modernize legacy IT systems; (ii) improved services; (iii) implement enterprise; and (iv) implement enterprises. Also, the digital standards have been set as a fundamental guideline for the application and promotion of the digital government in Canada. These include:

1. Design with users
2. Iterate and improve frequently
3. Work in the open by default
4. Use open standards and solutions
5. Address security and privacy risks
6. Build in accessibility from the start
7. Empower staff to deliver better services
8. Be good data stewards
9. Design ethical services
10. Collaborate widely

In the context of the COVID-19, digital government is even more meaning since it could help address challenges brough about by restrictions and physical disruptions. The Government of Canada has harnessed the digital government as a solution to adapt to, and recover from the COVID-19, including missions to deliver services to Canadians online; move to the

cloud; enable government employees to work from home; and have supported 283,622 employees to work remotely. In particular, relevant apps have been developed and in use to facilitate access to digital government's services in a timely manner, such as the "ArriveCAN" (user-friendly digital tool to help travellers comply with Canada's border measures)" and "Notify app" (a simple way for government to send email and text notifications and a key tool in the fight against Covid).

4.2. Governments' approaches, preparation, and institutional transformation from the experiences of Victoria State, Australia, presented by Ms Carolynne Hamilton, Acting Executive Director, Digital, Design and Innovation - Digital Victoria, Department of Premier and Cabinet, Victoria, Australia

The Victoria State of Australia has developed a consistent approach to promote the digital economy and digital government through focusing on building core infrastructure and policy settings, including efforts to develop the whole of government digital strategy; governance and assurance; policy and innovation; digital infrastructure and operations; skills and capability; design and delivery; operations and support. Among those is the Cyber Security Strategy 2021 serves as a vision and guideline, which promotes Victoria a safe place where government, industry and the community connect and deliver services safely and securely online and in the physical world, with reduced risk through three core missions: (i) the safe and reliable delivery of government services; (ii) a cyber safe place to work, live and learn; and (iii) a vibrant cyber economy.

In the process of Victoria's digitalisation, such factors as people, infrastructure, interoperability, and policy design are well placed in the centre. With views of ensuring that people have the capability to fully access to the digital economy and digital government, Victoria has launched a range of programs targeting various stakeholders such as the Upskill My Business, which focus on business owners to prepare for a strong recovery; the Digital Jobs Program to provide mid-career Victorians with up-to-date digital skills and place them in paid digital roles with business; the Tackling the Digital Divide to get Victorians into jobs for educationally disadvantaged adults; or the Social Seniors building technology skills for people aged 60 and over.

Regarding the infrastructure development approach, Victoria has built Application Programming Interface (API) with core infrastructure that lays the foundations for an 'API first' approach to data sharing across the Victorian Public Service. The API capability is expected to help enhance government's ability to deliver services that meet citizen expectations by enabling joined-up service delivery based on real-time, secure and up-to-date data; increase the sustainability of government's information-sharing infrastructure and capability; reduce the cost of government business through automation of manual data-handling processes, creation of new and efficient integrations between IT systems and enabling the modernisation of legacy systems; and promote innovation by making it easier for developers within government and the community to discover, access and use government data to create innovative and useful products.

In the context of the COVID-19, though it is unprecedented, Victoria Government has responded quickly and efficiently since they do not only provide all the related information necessary to COVID 19 that every citizen could access fully online, but they also promote other digital services to avoid and respond to physical disruptions, ensuring connectivity across the State.

IV. Recommendations and Conclusions

Through the sharing of information and experiences among APEC member economies at the Workshop, speakers and participants have exchanged views on what individual government and APEC should do to promote digital economy. Recommendations are as follows:

1. Promotion of blockchain and sandbox application to support business community, especially SMEs in the rise of COVID-19.

Due to the COVID-19 pandemic, business community face with physical disruption due to travel restrictions, people's mobilization, etc., it is essential that technology should be harnessed to address with the challenges. Among those, it is recommended that the application of blockchain and sandbox should be in place.

Blockchain can be understood as a distributed database of records or public ledger of all transactions or digital events that have been executed and shared among participating parties (Stanciu, 2017). This technology provides an efficient way of recording transactions or any digital interaction in a way that makes it secure, transparent, highly resistant to outages, auditable (Banafa, 2017). Blockchain is a new platform for manufacturing and new business chance. Blockchain has 04 main characteristics which are immutability, decentralization, anonymity, and security.

In practice, once blockchain is used, it may not work perfectly as wanted or need to be modified. Therefore, the concept of sandbox can be used for trial and error to find the best solution. Sandbox is a trial-and-error approach where the parties can "play" with the blockchain and find the one that fit with their current situation. There is a clear definition of sandbox in software development, according to Schreuders, et al. (2013), sandbox is a component in the IT environment, where the Developers generally do a lot of testing with the Application in concern, that might be useful to them at a point in the future. Therefore, sandbox is generally a place where the IT Developers roam free and change stuff to understand the impact and the adversities that might come if a particular change is to happen in a system. Often, the sandbox is cloned with the Production Instance so that the Developers can play with live/real data. However, sandbox is not only used in software development but can also applied in other areas such as finance, manufacturing, agriculture etc. Through the use of sandbox concept in business, sustainability can be achieved.

There are multiple ways to support blockchain and sandbox development. As a background, cooperation between parties to develop a supportive digital environment is

needed. Then certain activities can be facilitated for further development, such as cooperation with university to train workforce, holding a competition to initiate innovations, financial support for research and development and holding or support international activities.

In sum up, both sandbox approach and blockchain platform can be applied to do international trade. Through blockchain, the transparency is gained. It will link every activity and every party in the system. This will build trust among government, companies, and consumers. Blockchain also makes international trading practices more effective and efficient. Sandbox approach can be used to do trial and error to find the best solution for international trading activities.

2. With views of support business community, apart from technology and innovation, competition law and other relevant laws such as data protection law, consumer protection law, cybersecurity law should be considered

Although competition is encouraged in both traditional and online modes of business, monopoly could be a serious problem and adversely affect business, especially MSMEs. Therefore, while focusing on innovation in digital platforms, competition law and other relevant laws such as data protection law, consumer protection law, cybersecurity law should be aware to ensure laws compliance. With the cross-border nature of digital platforms, competition laws of many economies apply extra-territorially which mean that anti-competitive behaviour occurring outside of that territory but have significant anti-competitive effect on their market. At the other end, competition law and other related laws applicable to digital platforms should be reviewed to ensure that the laws can foresee and can follow up with particulars of digital economy, in a way that promote innovation, digital economy as well as consumer protection.

3. Digital technology advancements require proper and timely review and/or creation of regulations

Due to the rapid developments and advancements in technologies and digital technologies, the world has witnessed prominence of artificial intelligence (AI), machine learning, big data, blockchain, internet of things (IoT), unmanned aerial vehicles, so on. With such advancements, it is recommended that regulations in those areas should be reviewed and/or created to ensure that they catch up with the real developments, cover and address outstanding issues with views of ensuring a fair, sustainable, and inclusive growth and development.

4. Connecting policy design with data, digital and human centred design

With views of promoting digital economy and digital government, people should be placed in the center in the policy design since they are not only the subjects but also affected by the process itself. The human centred design (HCD) approach is recommended that it could

lead to the creation of government services that align with people's needs and desires. Involving end users in the overall design process leads to greater buy-in and impact.

5. Focus on upskilling to well prepare, adapt to, recover, and develop in the new era and in the rise of COVID-19

Given rapid changes in the 4IR and the context of the COVID-19 pandemic, education and training, skill upgrading would play an important to support people to survive and adapt to new situation as well as promote business's survival and growth. In that sense, it is recommended that the upgrading should take into account the followings:

- Develop sector-specific 4IR adoption roadmaps
- Develop a series of industry-led TVET programs for 4IR skills
- Implement an incentive scheme for firms to train employees for 4IR
- Provide support for training institutes to incorporate 4IR technologies into courses
- Strengthen quality assurance mechanisms for training institutions
- Strengthen social protection measures in context of 4IR.

6. Promotion of environmental sustainability

Given the global climate change and its increasingly serious impacts on the economies, issues of environmental sustainability should be taken into account while promoting digital and technological developments and the digital economy. Otherwise, economic growth and development can be at the expense of environment and sustainability. On the other hand, environmental sustainability could be achieved thanks to the efficient application of digital and technological advancements in wide areas such as electricity, energy, agriculture, so on. It is important that economies develop a consistent and systematic approach and policy, which facilitate the development of these areas while still promoting the digital economy.

Here are some recommendations for further thoughts and discussion at the upcoming CTI Meetings.