COVID-19 PANDEMIC AND ADDRESSING DIGITAL DIVIDE IN MALAYSIA

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ABSTRACT: The recent Covid-19 pandemic outbreak has caused a significant surge in the access and use of digital technology due to the nationwide lockdowns and social distancing norms. The surged move to digitalisation during Covid-19 pandemic is a double-edge sword. Many significant benefits, such as online activities and education, have been provided by the digital transition. However, it has likewise uncoated old bruises of digital divide that are too familiar in information, management and economics research. Covid-19 pandemic has abruptly forced students and youths to engage in online schooling, studies, other virtual social interactions. In this study we address the issues of Information and Communication Technology (ICT) access and use among urban and rural youths in Malaysia, knowledge-based economy (K-economy) and the possible implications for research and practice. We argue that despite the recent Malaysia's digital progress, the digital divide still persists in many aspects of economy. Yet, some fragments of societies are not able to transcend their limitations of lacking technological devices and skills due to socioeconomic motives. As a result of these limitations, it susceptibly affects youth education attainments, type of jobs and income generations. Therefore, introducing appropriate ICT skills and digital literacies during their lower education will give the better opportunity to them. In summary, it ascribes the inequality factors of digital divide to their motivational and usage accesses. Malaysia concurrently needs to ensure the economic and potential benefits of the emergence of digital economy. The digital economy helps forwards Malaysia to achieving sustainable and productivity growth, and greater inclusivity.

KEY WORDS: *Covid-19 pandemic; Youth; Digital divide; Knowledge-based economy; Malaysia*

1. INTRODUCTION

Covid-19 pandemic situation brings the effects of the unprecedented global lockdown as everyone adapts to the "new normal" (Barnes, 2020). In Malaysia, the coronavirus (Covid-19) Movement Control Order (MCO) was initially implemented

in the middle of March 2020 that students were on their one-week holiday. The school holiday period was subsequently extended from the first phase to third phase of MCO between March and August 2020. Primary pupils, secondary and tertiary education students decide to correspond through digital network and virtual social interactions. They use the information and communication technologies (ICT) for online studies, educational activities and entertainments. Meanwhile, nationwide schools and colleges are deploying educational online-learning programmes to reach school pupils and university students in recent times. Schools, colleges and universities around the globe have dramatically switched their classes to video conferencing platforms such as Zoom, Google Meet, Cisco Webex and Skype (De', Pandey, & Pal, 2020).

The surged move to digitalisation during Covid-19 pandemic is a double-edge sword. Many significant benefits, such as those aforenamed online activities and education, are realised through the digital transition. Contrarily, it has uncoated old bruises that are too familiar in information, management and economics research. This drawback includes the "digital divide" in relation to certain demographic groups that are technologically disfavoured through lack of devices, access, skills, content relevance, and unaffordable internet data plan (Armbrecht, 2016, 23 February; De' et al., 2020; Hilbert, 2014). Low education level, low income, disabled, elderly and certain (minority) ethnic groups are vulnerable society who still prevail and irregularly affect their digital futures (Barnes, 2020; Livari, Sharma, & Ventä-Olkkonen, 2020).

Digital divide or exclusion generally reflects the broader issues of inequality across age, gender, social and economic dimensions, where the cost of internet access can be restrictive for low-income families and the infrastructure is unevenly distributed across urban and rural areas (Thomson Reuters Foundation, 2020, 13 March). van Dijk (2012) categorised digital access into 4 types: material, motivational, skills and usage. The material or device access come first as it is a prerequisite for the subsequent three accesses in harnessing the digital world. No possession of computers and internet networks could be a failure in addressing modern digital technology (van Dijk, 2005). In addition, the MCO extensions could be another limitation of internet infrastructure and other ICT amenities. It similarly raises some concerns for Malaysian teachers and parents in dealing with learning from home, online classes and virtual social correspondences (Gong, 2020). These online activities might be easier for those who have access to the digital network (van Deursen, Helsper, Eynon, & van Dijk, 2017).

Furthermore, the challenge for many developing countries like Malaysia is to ensure all segments of population have access to proper technology and skills in navigating the diverse information. In reality, digital transformations have not fully been achieved and translated despite the rapid growth of technology (World Bank, 2018). The digital transformation exacerbates population who remain unconnected as haunting disparities in terms of digital access such as age, education background, geography and income proportion (Bunyan & Collins, 2013; Cheah & Chun, 2017; Peng, Wang, & Kasuganti, 2011).

An effective digital and ICT ecosystem in both urban and rural areas across Malaysia is necessary for the 12th Malaysia Plan (2021-2025) to be successful. The surge of online technology during the Covid-19 pandemic makes it important to

analyse the current digital divide. In this paper, we discuss some possible scenarios and compelling issues of digital divide among youths, their education and the importance of knowledge-based economy (K-economy) of the post-pandemic world in the foreseeable future. In the final section, we present our conclusions.

2. ACCESS AND USE OF TECHNOLOGY

In the current society, the existence of knowledge – intensive activities play an important component of the economy as the population is stratified based on its knowledge streams. The vast diffusion of digital technology, network-connected machine and the internet across the population has extensively mediate the potential effect of social, cultural, politics and economies to the society at large. Technology guardians have heralded the potential benefit of technology such as lowering inequality and reducing the barriers to information. Given the presence of technology, people of all backgrounds could also expand their social networks, improve their human capital, have better access to health information, search for better jobs and opportunities.

The disparity spread of technology across the population could however lead to increase inequalities by improving those who are privileged while refuting chances for advancement to the underprivileged. Looking at the developing countries in some part of Africa and Asia continents, only a small percentage of the population is online. Unsurprisingly, this discrepancy correlates with other measures of social and economic inequality. Yet, the complex reality of various people's access and use of digital technology cannot simply be described by the simple definition and interpretation of digital divide.

The ancient problems of digital divide were previously framed in more abstract terms, such as knowledge gap, computer literacy and the participation in the information society (DiMaggio & Hargittai, 2001; van Dijk, 2005). These problems merely look from the perspective of information technology and engineering with minimum engagement of other disciplines such as economics, management, sociology, communication and other sciences. In the past decades, social scientists and policy makers have gradually focused on social disparity between those "have" and "have-not" access to computers and the internet. In the mid-1990s, the National Telecommunications and Information of United States of America used a phrase "digital divide" and also applied it in developed and developing countries (Warschauer, 2003). In the field of digital divide research, Riggins and Dewan (2005) critically examined the three levels of structure: individual, organisational and countries, which show variations of access and use. These two variations are then be considered into first and second order effects. The first and second order effects examine the inequality of physical equipment access and the inequality of ability to use computer and other network-connected machines, respectively.

Moreover, some people believe that the lack of digital access and use could easily be catered by a supply of computers and other network-connected machines. The process of technology adoption is primarily started with the provision of equipment. This process then comprehends an identification on technological embeddedness which includes the design of adoption information technology for the household. The usage and embeddedness of technology in household occurs from the interaction between family behaviour and technological space (van Dijk &

van Deursen, 2014; Venkatesh, 1996). Technology has been acknowledged as useful knowledge; the steps of obtaining knowledge; in turn encapsulated in invention, innovation and dissemination; protection of knowledge; economic production; know-how; continuities in knowledge generation as well as its spread, including imitation, openness and embeddedness. (Farrands, Talalay, & Tooze, 2005; Khazanah Research Institute, 2021).

The presence of youth in the household may influence family members' ICT access and use. Studies have shown that household with young people are more likely to acquire access to a computer and the internet, to increase adults' interest in using the internet for a range of different purposes such as managing household and health, to motivate family members improving their online skills (Eynon & Helsper, 2015; Goolsbee & Klenow, 2002; Jackson et al., 2006).

The Information and Communication Technology (ICT) Access and Use, Department of Statistics Malaysia report 2018 describes the current annual figures of Malaysians digital usage and accessibility (Department of Statistics Malaysia, 2019). The trend of utilisation devices such as internet and computer has increased from 2017 to 2018. The nationwide households' access to internet increases from 85.7 percent in 2017 and 87.0 percent in 2018, while the access to computer, as it refers to a desktop, a laptop (portable) computer or a tablet (or similar handheld computer), decreases from 74.1 percent to 71.7 percent (Department of Statistics Malaysia, 2019).

The percentage of individuals using computer by state and strata 2018 shows a wide disparity of national access between urban (75.6 percent) and rural (54.1 percent). The contrasting trend also reveals the discrepancy of percentage of internet usage by individuals in urban (84.9 percent) and rural (69.4 percent) (Department of Statistics Malaysia, 2019). Among the rural pupils and youths, this situation has eagerly stretched their expenses to catch up with the latest technology and information. These 15-20 years old age groups, need to expose into highly ICT skills during their study periods. It shows that only 5-6 percent of rural youths are able to operate computers and confident to do main computer tasks. Consequently, the rural youths, aged 21-30 years old, lack ICT skills and are being technophobes (Department of Statistics Malaysia, 2019).

Malaysia is facing a latent digital exclusion. Low-income families depend on mobile devices for internet access that are not suitable for learning purposes (Thomson Reuters Foundation, 2020, 13 March). The digital exclusion between state and strata in 2018 is observable from the very low percentage of computer usage and basic ICT skills (Department of Statistics Malaysia, 2019). These basic ICT skills will be explained later in the following section.

3. TRENDS AND PATTERNS OF YOUTH IN TECHNOLOGY

The datasets of the ICT Access and Use by Individuals and Households Survey, Department of Statistics Malaysia 2018 are used to describe inclinations of youth in technology. These secondary datasets are officially provided by the approval and permission of Department of Statistics Malaysia (DOSM) for academic purposes. Micro datasets for the ICT survey 2019 and 2020 are not available as yet. In this study, the number of youth respondents are represented by 3576 males and 3286 females; most are between 15 and 30 years old. It collects 3,865 urban youths and

2,997 rural youths, which comprise Malay (75.7 percent), other Bumiputra (14.1 percent), Chinese (7.0 percent) and Indian (3.1 percent) ethnicities in peninsular and east Malaysia states. The percentage of youth's education profile by gender and strata is explained in Fig. 1.

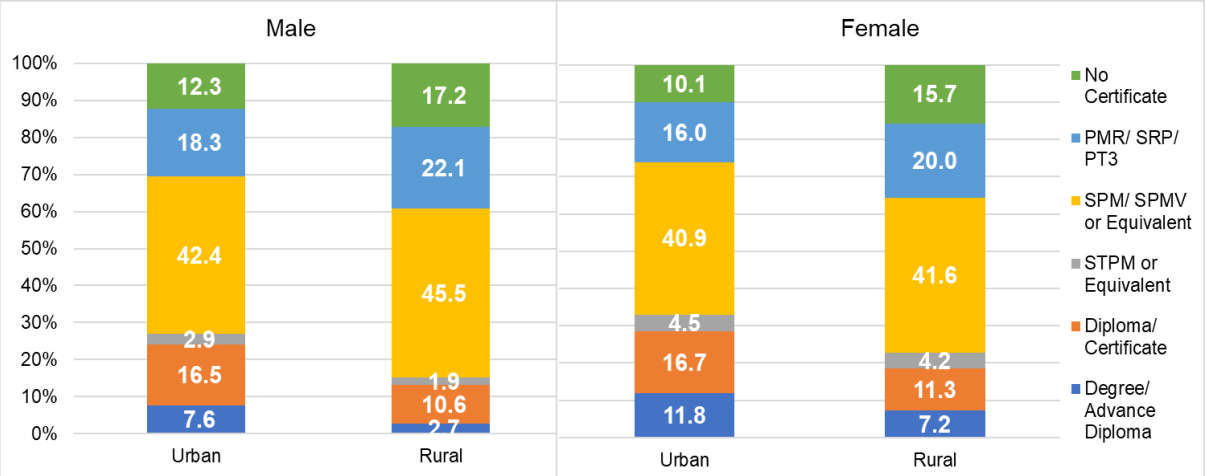

Fig. 1. Percentage of youth's education profile in peninsular and east Malaysia states, by gender and strata, 2018 (Authors' computed from the 30 percent sample data of the 2018 ICT Access and Use by Individuals and Households Survey).

The percentage of education profile among youths between urban and rural areas describe a similar pattern. Fig. 1 shows higher percentage of Sijil Pelajaran Malaysia (SPM)/Sijil Pelajaraan Malaysia Vokasional (SPMV) or equivalent between male and female in urban and rural areas. The percentage of male's and female's SPM/ SPMV holder is slightly higher in rural areas than urban areas, given that male at 45.5 percent and female at 41.6 percent. In contrast, the percentage of female's Sijil Tinggi Persekolahan Malaysia (STPM) or equivalent is higher than male's certificate obtained. The female's STPM or equivalent is nearly double at 4.5 percent than male's at 2.9 percent in urban areas, while rural female's at 4.2 percent and rural male's at only 1.9 percent. The percentage of degree/ advanced diploma is also higher among females than males in both strata. Urban female's degree/ advanced diploma holder unveils the highest percentage of tertiary education certificate at 11.8 percent as it compares to male's at 7.6 percent.

In the 2018 ICT Access and Use by Individuals and Households Survey, youth, aged of 15-30 years old, generally have computer and internet at their homes. The computer access is explained by the ownership and utilisation of computer for each individual. The concept and definition of indicators are based on United Nation's International Telecommunication Union (ITU) manual 2014, which is also used by DOSM (Department of Statistics Malaysia, 2019). In addition to that, nine basic computer skill activities are presented in Fig. 2 and 3. The following figures are explaining the percentage of youth's ICT knowledge and skills in urban and rural areas.

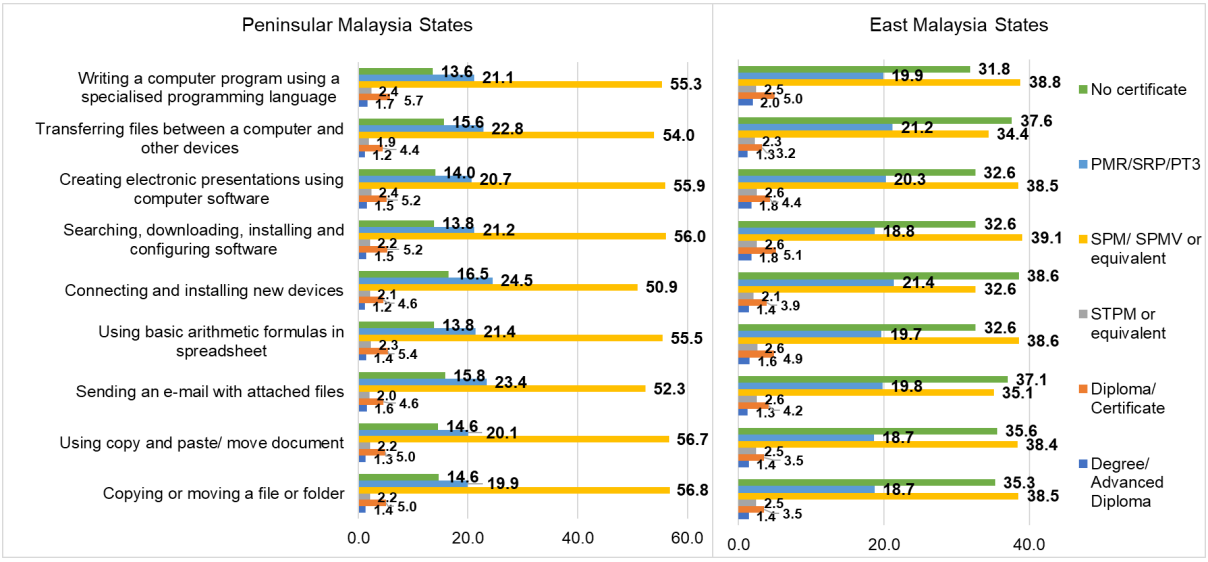

Fig. 2. Percentage of urban youth's ICT knowledge and skills shortage, by education profile, 2018 (Authors' computed from the 30 percent sample data of the 2018 ICT Access and Use by Individuals and Households Survey).

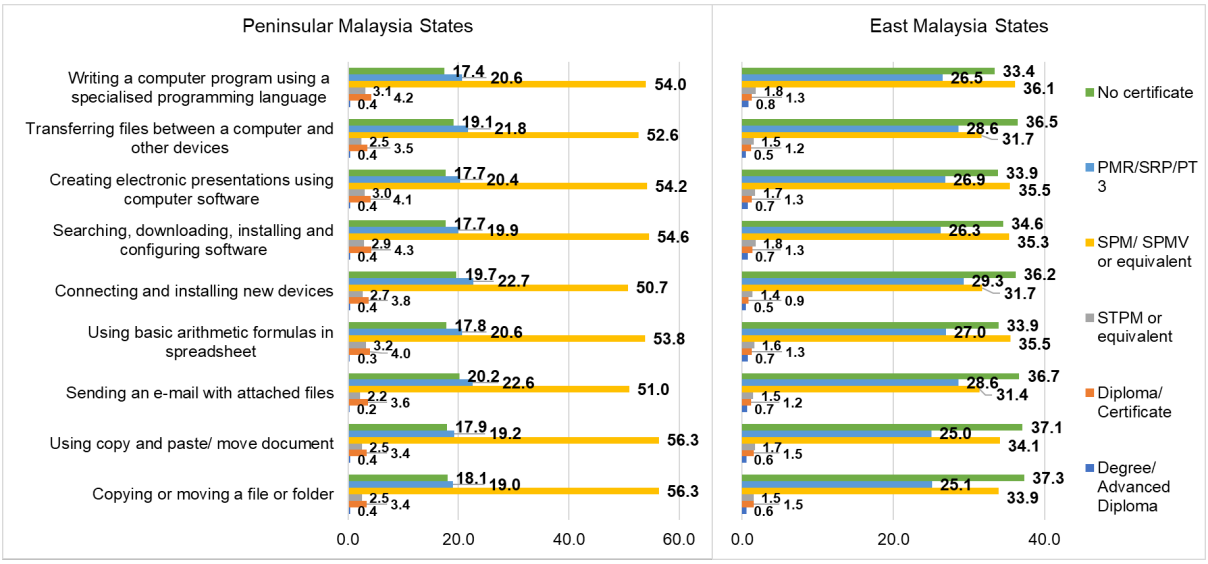

Fig. 3. Percentage of rural youth's ICT knowledge and skills shortage, by education profile, 2018 (Authors' computed from the 30 percent sample data of the 2018 ICT Access and Use by Individuals and Households Survey).

Fig. 2 and 3 show the basic ICT activities by strata in peninsular and east Malaysia states. The percentage of urban youth's ICT knowledge and skills displays relatively comparable data with rural youth's ICT activity distributions. The profile of education represents the highest educational certificate that obtained by urban and rural youths in 2 regions. In both regions, the percentage of SPM/ SPMV or equivalent holders is higher than other certificate holders between urban and rural. In Figure 2 and 3, two shortage tasks, *copying or moving a file or folder* and *using copy and paste/ move document* exhibit the two highest percentage of SPM/ SPMV

or equivalent holders in peninsular Malaysia state, which is identical slice at about 56 percent. The rest of seven main activities remain high obstacles in coping with ICT skills among urban and rural youths in peninsular states.

In east Malaysia states, the percentage of SPM/ SPMV or equivalent holders closely shared similar figures with primary school leavers or non-certificate holders, which is above 30 percent (Fig. 2 and 3). Yet, it is followed by the rural PMR/SRP and PT3 holders at approximately 25 – 29 percent. Three education profiles; primary or non-certificate, lower secondary (PMR/SRP/PT3) and upper secondary (SPM/SPMV or equivalent) holders display higher percentages of skills shortage across all nine ICT activities. These proportions release some striking patterns of ICT skills ability among urban and rural users as it indicates a huge ICT knowledge and skills gap among urban and rural youths nationwide.

Another crucial topic in ICT access and use are the issue of computer and internet disconnectivity by strata in peninsular and east Malaysia states. The poor rural connectivity has persisted in Malaysia, with internet and broadband penetration less than urban throughout time (Mohamed, Judi, Nor, & Yusof, 2012). Disconnectivity issues encourage us to investigating urban and rural disparity by education profile, which is shown in Fig. 4 and Fig. 5.

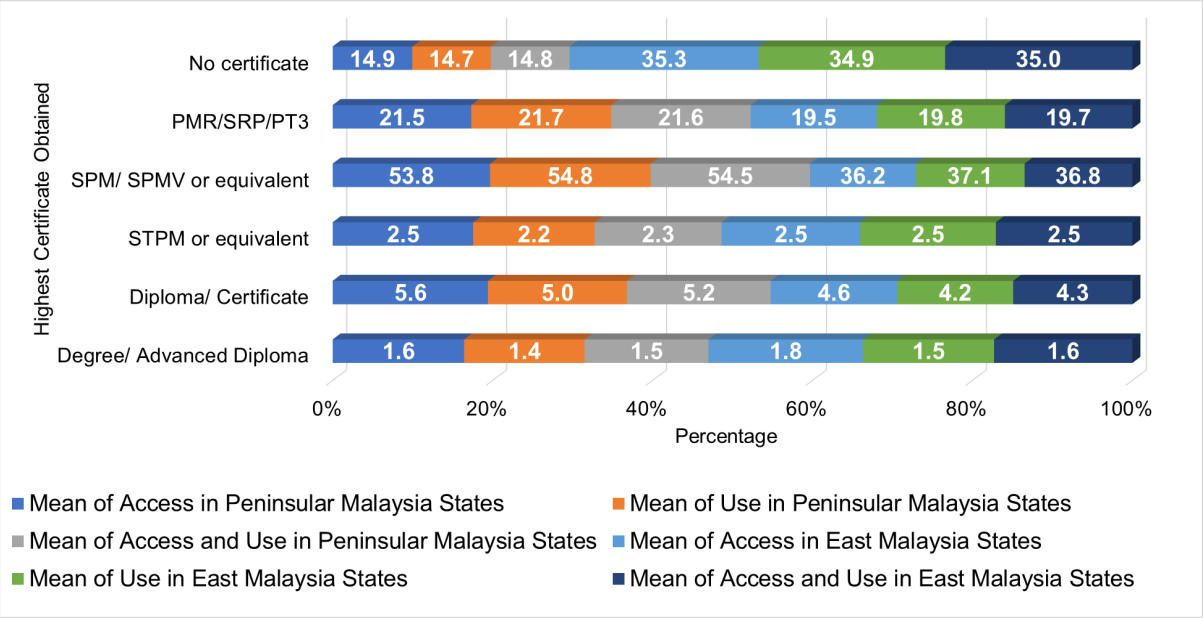

Fig. 4. Mean urban youth's computer and internet disconnectivity in peninsular and east Malaysia states, by education profile, 2018 (Authors' computed from the 30 percent sample data of the 2018 ICT Access and Use by Individuals and Households Survey).

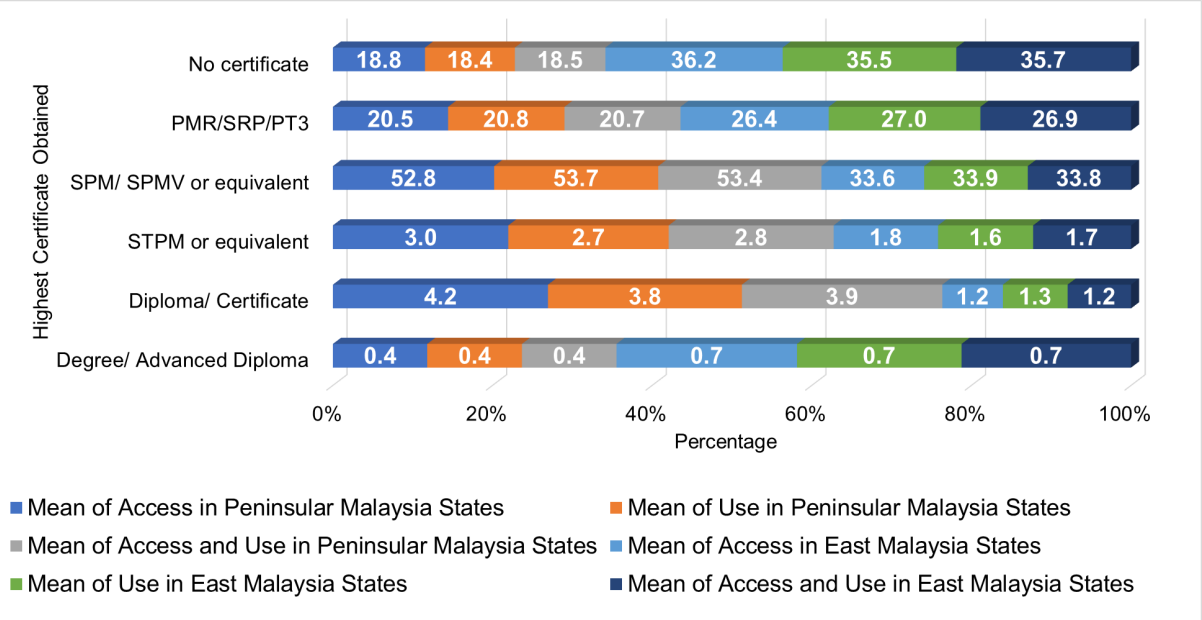

Fig. 5. Mean rural youth's computer and internet disconnectivity in peninsular and east Malaysia states, by education profile, 2018 (Authors' computed from the 30 percent sample data of the 2018 ICT Access and Use by Individuals and Households Survey).

The DOSM report unveils some important figures that could be used to address the current issues of digital connectivity during the Covid-19 pandemic and future. It uncovers computer and internet gap among youths in two regions by comparing aggregate mean of disconnectivity access and use between urban (Fig. 4) and rural (Fig. 5) areas.

In Fig. 4 and 5, SPM/ SPMV or equivalent holders shows the highest mean of access and use disconectivity at 54.5 percent and 53.4 percent in peninsular states, respectively. Meanwhile, the means of access and use in east Malaysia states are lower than peninsular states, at 36.8 percent (urban) and 33.8 percent (rural).

The non-certificate holders or primary education leavers display soaring percentages of computer and internet disconnectivity as it is clearly seen the average of access and use in Fig. 4 (35 percent) and Fig. 5 (35.7 percent). These students in eastern part of Malaysia reveals a surge average of access and use for computer and internet disconnectivity.

In urban areas of peninsular Malaysia, the percentage of PMR/SRP/PT3 qualification holders are higher (21.6 percent) than similar education certificate holders in Sabah, Sarawak and F.T. Labuan (19.7 percent). However, the disconnectivity percentage of rural youths with PMR and equivalent qualification is expectedly higher in east Malaysia (26.9 percent) than peninsular states (20.7 percent). It displays opposite trends of lack of access and use for computer, internet connectivity and digital tasks. This condition indicates that computer and internet inequality is also happened in urban areas, whilst the cities offer better digital infrastructure and connectivity.

Coping with Covid-19 pandemic could somehow motivate youths and students in this difficult time. Everyone likely find that some aspects of their works, studies, social gatherings can be done remotely and over online video chats. People in rural areas are perhaps less likely to have an ICT device and internet data at home. This situation is even more challenging to download school materials and other educational resources. They really experience different connectivity settings. This problem is potentially to be more noticeable in rural areas, as it is shown in Fig. 5.

Fig. 4 and 5 correspondingly draw present-day computer access and internet usage among youths in urban and rural areas in peninsular and east Malaysia states. Urban students and youths may have easier access to the internet, but there are some in rural areas who have to go to great lengths to get good connectivity. Recent news of disconnectivity in Sabah, an 18-year-old Universiti Malaysia Sabah (UMS) student shared her digital divide story last year. She experienced the poor internet connectivity issues in her village, Kampung Sapatalang, Pitas, Sabah. She had to stay few days on top of a lanzones fruit tree in the jungle to get internet access for attending online courses and exams. Stable internet connectivity is not readily available in her village and other parts of Sabah. Studying off-campus due to the MCO amid this pandemic of Covid-19 give a burdensome for her and other unfortunate students in remote areas (Khazanah Research Institute, 2021).

4. DETERMINANTS OF CONNECTIVITY AMONG URBAN YOUTHS - A RECENT EMPIRICAL VIEW

A survey of computer ownership and ICT skills in Kuala Lumpur Federal Territory was completed on the brink of Covid-19 pandemic last year. The survey was based on Department of Statistics Malaysia's 2010 demographic sampling enumeration blocks and living quarters lists in Kuala Lumpur, and 2019 Household Income and Basic Amenities Survey in Kuala Lumpur Territory Report. It randomly selected 768 households in 11 districts in Kuala Lumpur. A cross-sectional primary survey data with a total of 562 youth respondents, age 15-30 years old, from 658 households, at 85 percent response rate, was conducted between February – July 2020. The sample could be considered heterogenous because the characteristics of the respondents are typically of a mix urban population; the majority of three ethnic populations and a blended percentage of the socioeconomic families. Further, more than 38 percent of the surveyed youths aged between 15 and 18 years old, with around 39 percent obtained lower secondary education qualification. Table 1 summarises the demographic characteristics of the respondents.

Table 1: Demographic characteristics of participants

Description	Values/ Levels	N [562]	Percentage [%]
Gender	Male	301	53.6
	Female	261	46.4
Age (years)	15-18	217	38.6
	19-22	104	18.5
	23-26	110	19.6
	27-30	131	23.3
Highest Educational Qualification	Tertiary Education (Diploma, Advanced Diploma, Degree)	189	33.6

	Upper Secondary Education (STPM, SPM/SPMV or equivalent)	147	26.2
	Lower Secondary Education (PMR/ SRP/ PT3)	220	39.1
	None of the Qualifications/ No Answer	6	1.1
Household Income Group	**B40 (Less than RM9,149)**	**336**	**59.8**
	B1 (Under RM5,150)	126	22.4
	B2 (RM5,150 – RM6,619)	115	20.5
	B3 (RM6,620 – RM7,969)	42	7.5
	B4 (RM7,970 – RM9,149)	53	9.4
	M40 (RM9,150 – RM16,639)	**184**	**32.7**
	M1 (RM9,150 – RM10,549)	49	8.7
	M2 (RM10,550 – RM12,069)	50	8.9
	M3 (RM12,070 – RM14,019)	38	6.8
	M4 (RM14,020 – RM16,639)	47	8.4
	T20 (RM16,640 and more)	**42**	**7.5**
	T1 (RM16,640 – RM22,619)	25	4.4
	T2 (More than RM22,619)	17	3.0
Working Status	Full-time Work	237	42.2
	Student Status	277	49.3
	Part-time Work	48	8.5
Computer Ownership	Own Computer	215	38.3
	Otherwise	347	61.7
Computer Experience	Sharing Computer	154	72.0
	Otherwise	61	28.0
Internet Experience	Own Internet Access	455	81.0
	Otherwise	107	19.0
Ethnic Language Group	Malay	329	58.5
	Chinese	125	22.2
	Indian	98	17.4
	Other Bumiputera	10	1.8
City Neighbourhood District	Kepong	23	4.1
	Batu	42	7.5
	Wangsa Maju	79	14.1
	Segambut	89	15.8
	Setiawangsa	50	8.9
	Titiwangsa	71	12.6
	Bukit Bintang	19	3.4
	Lembah Pantai	55	9.8
	Seputeh	52	9.3
	Cheras	37	6.6
	Bandar Tun Razak	45	8.0

The survey aims to investigate the presence of digital divide despite digital accessibility in urban area. In previous section, the percentage of education profile among youths between urban and rural areas in peninsular and east Malaysia states show comparable figure. Meanwhile, the percentage of youth's education profile in Kuala Lumpur pictures different trends between male and female. In Fig.

6, male and female pupils share nearly similar percentage in their lower secondary school level, at 40.6 percent and 38.4 percent, respectively. The percentage of upper secondary and tertiary education reveals an opposite trend as female has higher upper secondary school attainment at 31.4 percent than male counterpart at 22.1 percent. Conversely, the percentage of male's tertiary education holders (37.2 percent) is higher than female's holders (30.2 percent).

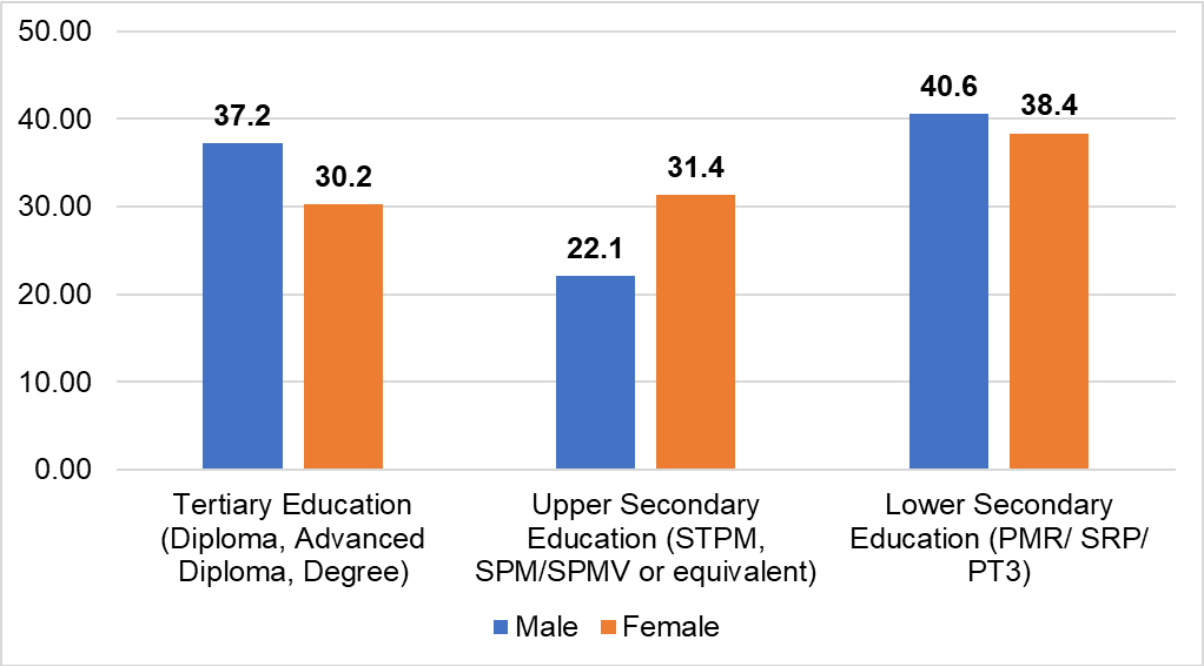

Fig. 6. Percentage of youth's education profile in Kuala Lumpur Federal Territory, by gender.

In the survey, the percentage of computer ownership is at least 38.3 percent. It is shown that most respondents (61.7 percent) do not have a computer to support their study and work in their households as shown in Table 1. However, the percentage of internet subscriber depicts higher percentage at 81.0 percent. Mobile internet is commonly subscribed by youths to support their smartphones and other mobile gadgets. Similar percentage of mobile internet subscription is also identified in the report of the 2020 ICT Access and Use by Individuals and Households Survey, at 89.6 percent (Department of Statistics Malaysia, 2021). The concept of ownership and utilisation of computer for each individual is defined by United Nation's International Telecommunication Union (ITU) manual 2014 and complied by the DOSM. Nine computer and ten internet skill activities, presented in Figure 7, are some of ICT knowledge and skill activities that ITU highlight in its manual to evaluate ICT access and use.

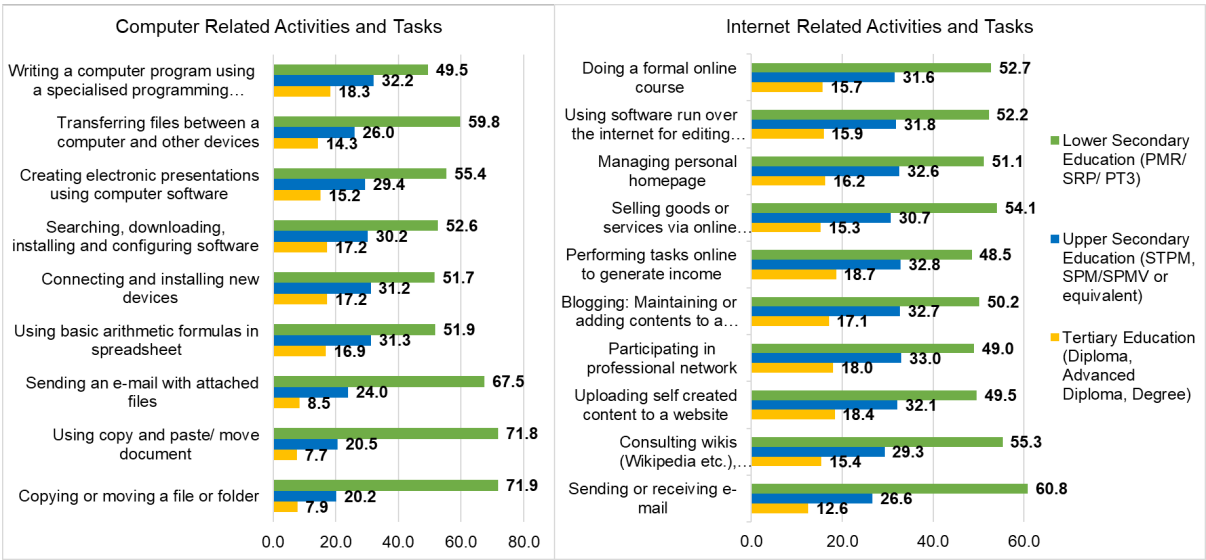

Fig. 7. Percentage of youth's computer and internet related skills shortages in Kuala Lumpur Federal Territory, by education profile.

Fig. 7 shows the cross-sectional survey that unveils some data on youth's computer related and internet activities in Kuala Lumpur. During the survey, respondents were also questioned whether they had utilised any computer and internet related tasks. Ten additional internet related works were asked to equip nine computer related skills that have been booked in the DOSM report. It is interesting to note the difference of some trends of urban youth's ICT knowledge and skills shortage between the DOSM report and this recent empirical field study. In Fig. 2, SPM/ SPMV or equivalent holders (upper secondary education level) uncover higher percentage of ICT knowledge and skills shortage in peninsular and east Malaysia states. Lower secondary education respondents in Kuala Lumpur however have a concerned lack of computer and internet related works (ICT knowledge and skills). Two highest percentages of computer related tasks are copying or moving a file or folder (71.9 percent), and using copy and paste/ move document (71.8 percent). These two tasks are very much relevant to the primary and lower secondary pupils during online learning in this pandemic of Covid-19.

Internet related tasks exhibit similar attributes of skill shortages among lower secondary education holders. The percentage of internet skill shortage among upper secondary education respondents remain high throughout all tasks, between 26.6 percent and 33.0 percent (Fig. 7). In general, lower secondary and upper secondary education respondents in Kuala Lumpur lack of computer and internet skills across 19 basic tasks. Education profile in recent survey also brings to the issues of ICT access and use more details.

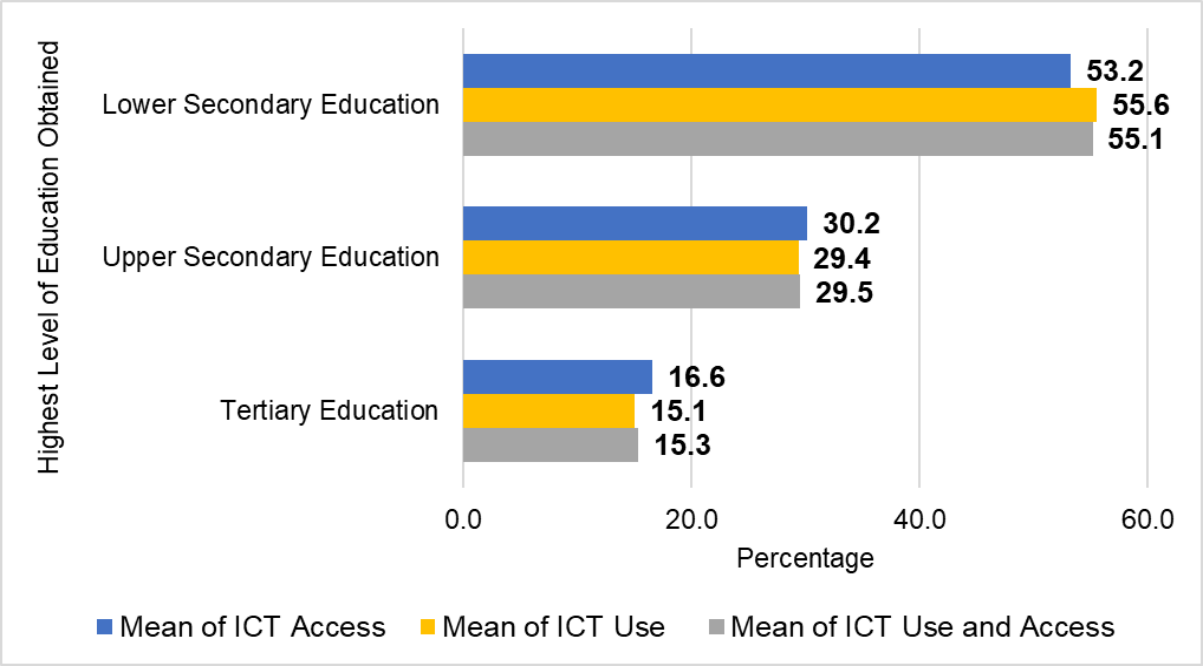

Fig. 8. Mean youth's computer and internet disconnectivity in Kuala Lumpur Federal Territory, by education profile.

The Covid-19 MCO is adjusting people to staying at home. Working and studying would be challenging as it relates to ICT access and use issues. Some survey data could be used to address the current issues of digital connectivity during this pandemic and future. In Fig. 8, the highest mean of disconnectivity is reported around 53–55 percent for lower secondary education respondents. This respondent group is encountering the biggest challenges due to equipment and skills. Upper secondary and tertiary education youths have better situations with the mean of shortage at nearly half and a quarter of the youth of lower secondary education, at around 30–15 percent, respectively.

The current Covid-19 new normalcy clearly uncovers digital divide picture. Definitely not all youths are in equal status to engage in their digitalised education. OECD (2019) highlighted that socioeconomically advanced youths outperformed disadvantaged youths in science, mathematics and reading in Malaysia. These issues are also related to ICT access and use–both among youths and adults. It involves skills and competences that is needed to integrate the digital devices into learning and teaching practices in more meaningful ways to gain benefits from them (OECD, 2019; World Bank, 2020).

5. REVISITING AND RESTRUCTURING KNOWLEDGE- BASED ECONOMY

The Economic Planning Unit (2015) has drafted the importance of adoption of information and communications technology in the 11th Malaysia Plan 2016-2020. Primarily, the 3rd Chapter of *enhancing inclusiveness towards an equitability society* brings the focus area A of *uplifting B40 households towards middle-class society*. This focus area A addresses some issues of the inclusiveness of society such as higher education and skills training, increase productivity through adoption of

modern technology, and enhancing adoption of ICT. These strategies are shown in Fig. 9.

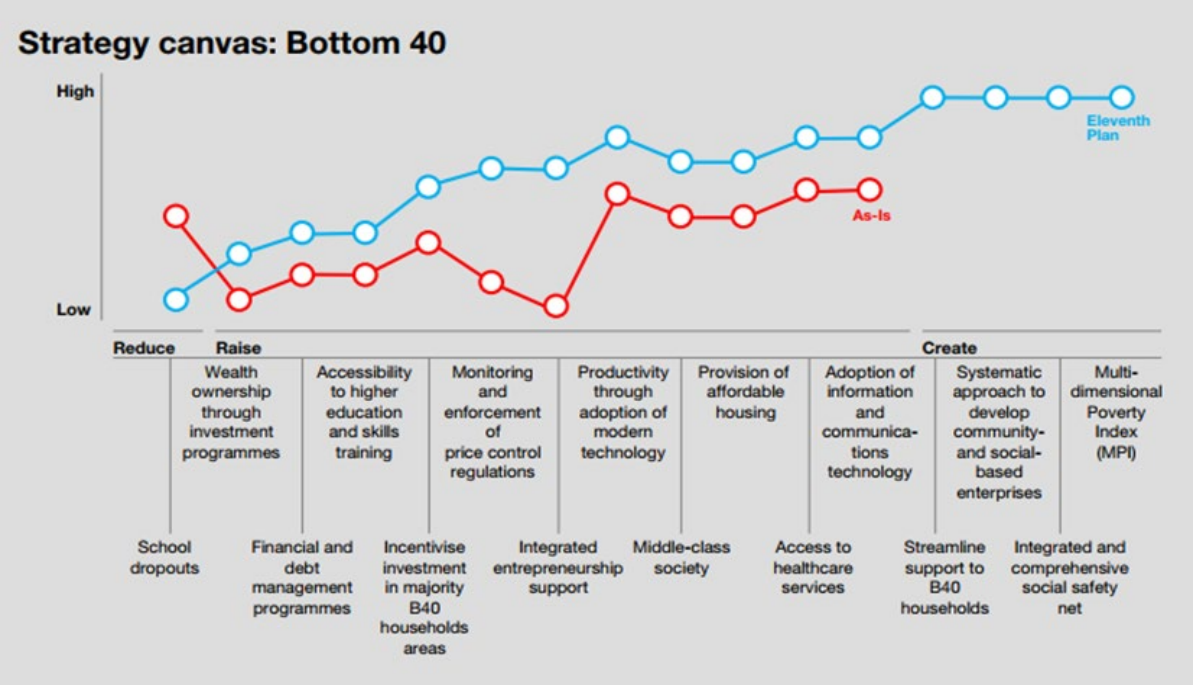

Fig. 9. Reduced, raised and created strategies of towards equitable societies (Economic Planning Unit, 2015).

In the chapter 3 of 11th Malaysia Plan 2016-2020, the following strategies have also formed another inclusiveness platform in the focus area B, which is empowering communities for a productive and prosperous society. This area mainly emphases on the establishment of family institution and the potential of youth development. Moreover, building human capital with knowledge and skills as well as moral and ethics require a lot of commitments in driving the process of inclusiveness and sustainable economic growth in Malaysia (Tan, Wong, & Noor, 2006). Consequently, in chapter 5, the government highlights the issue of human capital development in accelerating economic growth. This focus area includes the improvement of labour productivity and wages through the shift of high-skilled jobs by continuous upskilling and re-skilling initiatives. In facilitating high-tech equipment and improving technology-enabled innovations and educations, for instance, the problem/ project/ production-based learning, it could develop critical, creative and innovative thinkers in Science, Technology, Engineering and Mathematics (STEM) subjects (Economic Planning Unit, 2015).

Comprehensive online learning and overall education progression would be achieved by revisiting and restructuring education systems, strengthening digital and physical infrastructure to improve the quality of online learning modules and platforms. Inclusive learning system also assures strengthened infrastructure and support learning schemes for special needs (Ministry of Economic Affairs Malaysia, 2019). Concurrently, it proposes other strategies to enhance the soft-skills (language proficiency, problem solving, leadership, self-motivation, critical thinking,

time and conflict managements, and other related skills), which are commonly known in the area of knowledge-based economy (K-economy).

With the advancement of technology and sciences in the last two decades, knowledge has transformed into the key wealth creator and driven rises to intensify knowledge use in the Malaysian economy (Foo, Lai, & Elamzazuthi, 2017). K-economy is not a new approach for Malaysia as it had been introduced in the 1996 Malaysia Multimedia Super Corridor (MSC) and National Information Technology Agenda (NITA), and discussed in the 7th Malaysia Plan (1996-2000). The initial plan of K-economy was aimed for Malaysia to participate in a borderless world economy and compete with other highly developed and technological advanced countries. Later, K-economy could only be successful if it benchmarks in research and innovation from a national context, to excel in in the future.

Malaysia ought to utilise the Covid-19 pandemic period by re-thinking the initiative of transformation from a manufacturing-strong economy to K-economy. In this period, it is expected that Malaysia would really understand where the country stands with regards to research and innovation. Addressing research and innovation might involve accessing and using data indicators to establish benchmarks, determine any potential areas of research and innovation that are best to invest in, eventually produce frameworks that support and measures those areas. it hopefully improves Malaysia's quality of analytical outputs and study collaboration to bridge the gap between research and innovation.

A concerted effort between the government and private entities is needed to overcome the impact of Covid-19 in education. It is necessary for both parties to develop cost-effective education products and services that eliminate barriers to access and improve the quality of learning. The delivery of education, research, training, innovative measurement tools, etc could be improved by ICT solutions. The pandemic has re-emphasised the presence of digital divide and the primacy of internet access, particularly students and youths in rural areas (OECD, 2021). As the new necessities of the 21st century, internet access is helping us to benefit from e-learning, e-medicine and to work flexibly (Razak & Malek, 2008; United Nations Development Programme, 2020).

The Covid-19 restrictions shape people life into a new way of social interaction. Households without access to the online network, internet and other technologies might reduce their ability to apply and receive government support. Therefore, improving access to ICT devices and the internet is another policy to address inequalities, gaining people's capabilities that might include those who generate income. Out of school during Covid-19 means that every child in household with access to the internet have the opportunity to continuing structured learning. It shows the optimistic outlook of social ability to keep children and youths in education. Conversely, it is equally challenging to apply similar procedure to every household with low income, lack of internet (broadband) and proper ICT devices (hardware and software). Without ICT device and internet access, the effectiveness of learning process is obstructed and consequently intertwined performance among students and youths. The United Nations Development Programme (2020) reports that if countries have the internet access rate of the best performers in their human development groups, the truancy rate would be considerably lower, around 12 percent.

Government has recently introduced the Jalinan Digital Negara (JENDELA) or National Digital Network initiative in August 2020 and followed by Malaysia Digital Economy Blueprint (MyDIGITAL) in February 2021. The objectives of these mega plans are to improve Malaysia's digital connectivity with high-quality nationwide broadband coverage and to drive Malaysia into a high-income nation with digitally-driven economy by 2030 (Economic Planning Unit, 2020, 2021). Feasibly, these national plans would be well prepared by re-looking into pre-Covid-19 issues, past experience and failures to build toward improved plans in the future.

6. IMPLICATIONS FOR RESARCH AND PRACTICE

The future economy refers to the deployment of dynamic technologies and infrastructure. It is necessary to explore in upcoming high-tech areas such as automation, fintech, AI, digital economy. The government of Malaysia should provide some consistent policies that encourage young generation to adapt, participate and dominate the future economy. Learning society and future economy may bring outcomes such as increasing the number of innovations and high-skilled jobs to engage B40 group youths (Ministry of Economic Affairs Malaysia, 2019).

The Bank Negara Malaysia Annual Report 2017 revealed that Malaysia is currently at the adopter stage in the worldwide digital map. Malaysia's digital advancement is at par with several developed economies like Canada, New Zealand, Ireland, Australia, Slovenia, Latvia and Czech Republic (Bank Negara Malaysia, 2018; OECD, 2001). There are three key structural features that are needed to support a country's progression on the digital map.

Firstly, a fast and affordable internet (home broadband and mobile). Public digital infrastructure is needed to persuade digital participation and adoption. This infrastructure consists of fixed connectivity, digital identity, an efficient payment system, open data networks, online delivery services, telemedicine, financial services and others. Since the present government is considering to re-look past agenda of the 1996 National Information Technology Agenda (NITA), it is therefore necessary to re-introduce the InfoDesa (Internet Desa) programme, which was introduced by the Ministry of Rural Development in 2000 (Foo et al., 2017). In the past, InfoDesa has successfully embarked on an extensive initiative to create ICT awareness among village communities. Later, the InfoDesa programme should revitalise the newly modern knowledge and latest high-tech devices to villagers. It aims to facilitate the modern hardware/ ICT devices and software/educational (TVET) applications, installation and computer maintenance workshops, deliver the soft skills trainings and short courses on web and content development, computational and arithmetic skills, ICT-based entrepreneurship skills that should be beneficial for rural youths. Post office, Rural Community Centre and other public places could be used to establish a centre in every district nationwide (Dakian, 2007; Foo et al., 2017).

Secondly, human talents for digital advancement. The role of education system dominantly emphasis lifelong learning, encourage more interest in Science, Technology, Engineering and Mathematics (STEM) degrees and strengthen ICT literacy skills compulsory (i.e. computational mathematics, robotics, peer-to-peer learning, etc). OECD (2019), in the PISA Insights and Interpretations report 2018, Malaysia's score in mathematics and science was 440 and 438, respectively, which

is below the OECD average scores of 489 in both subjects. According to Ministry of Higher Education Malaysia, Malaysia's higher education institutions are going to release considerably more graduates in arts and social sciences and less so in STEM and technical- vocational fields between 2010 and 2025 (Bank Negara Malaysia, 2018). Left undauntedly, this development will disseminate a skill mismatch as economic actively becomes further digitally and technologically advanced.

Thirdly, high digital adoption among government and citizens for producers, consumers and businesses. Malaysia's digital adoption is growing increasingly although consumers' services such as internet banking and e-commerce remain quite low. Besides, the majority of internet usage in Malaysia is content consumption. The consumption of content such as social media, games and downloading movies/ music commonly confine rather than doing productive digital tasks such as mobile applications, content creations, learning from formal online courses and professional networking (Bank Negara Malaysia, 2018; Department of Statistics Malaysia, 2016). Malaysian youths only perform basic and standard level of ICT skills, while the performance of advanced skills is still a low level (Department of Statistics Malaysia, 2021).

7. CONCLUSION

While the Covid-19 pandemic causes devastating socio-economic impacts on people everywhere, researchers from various disciplines are ever more ascertained to make contributions in grappling with the current and future pandemics. Covid-19 pandemic originated an extensive, sudden and dramatic digital surge in the society.

This paper has highlighted a number of important paths for future digital development and education of Malaysian youth. The prevalence of digital divide is still existing in nationwide rural urban areas. The issue of digital divide is unfortunately soaring in the current Covid-19 new normalcy. The recent empirical study shows increasing trends in computer ownership and experience, ICT skills performance, views related to socioeconomic and demographic status. Moreover, we should not only consider bridging the access of hardware and equipment to youths, but also the usage of ICT capability and digital creative solutions. We should be more active in giving equal opportunity of digital access and use to empower youth in their digital futures. It subsequently reduces the barriers to social mobility and high-tech skilled jobs in the future. Eventually, it is hoped that this study may encourage other researchers to begin upon some future research studies in this important area.

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