.my CONVERGENCE

ISSUE 21

JENDELA+

A HOLISTIC INTERCONNECTION INFRASTRUCTURE

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The Malaysian Communications and Multimedia Commission

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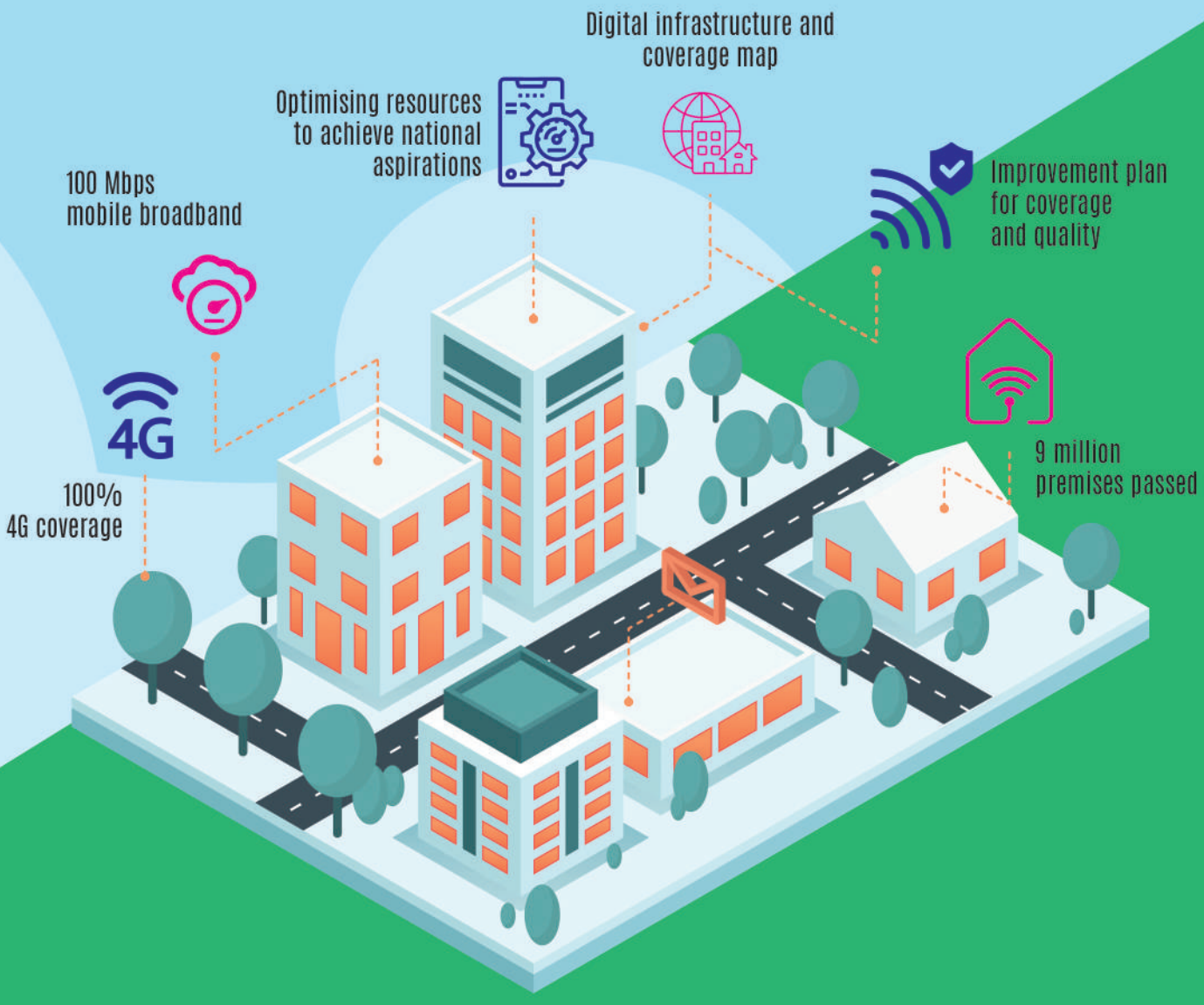
CONNECTIVITY FOR ALL

The Jalinan Digital Negara (JENDELA) plan was formulated to provide wider coverage and better quality of broadband experience for the Rakyat, whilst preparing the country for 5G technology.



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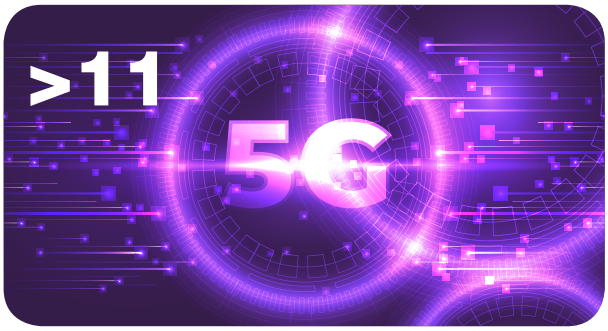

From the Chairman's Desk

Over the years, .myConvergence magazine has documented the progress of the Malaysian communications and multimedia industries, MCMC's regulatory work as well as innovative industry applications.

The cover story of this issue is on Jendela+, an initiative that arose from discussions at the National Connectivity Ecosystem Laboratory (NIEL) which was held virtually in June 2021. Industry players and other stakeholders came together to exchange ideas and experiences on how to strengthen the digital connectivity ecosystem more inclusively. Jendela+ focuses on 3 key aspects of digital connectivity: Hyperscale Data Centres (DC), Internet Exchange Points (IXP), and International Connectivity (IC), which are all components of a digital connection ecosystem. Details of the implementation of this initiative can be read in our cover story. On a related note, this issue also presents an article on 5G that envisions what Malaysians can look forward to when the latest generation wireless networks are rolled out.

Three interesting features in this issue are on ongoing initiatives aimed at bridging the digital divide. One is a study on the acceptance levels by B40 students in higher education institutions towards the PerantiSiswa tablet package. Over 380 students were surveyed and the results are in this issue. The second article is on Pusat Ekonomi Digital Keluarga Malaysia (PEDi), the internet centres in mostly rural areas that are imparting digital economy entrepreneurship skills training and skills to rural citizens. The final article is on the Posmen Komuniti initiative that is helping to expand door-to-door mail delivery services in rural areas.

Restoring communications speedily after disasters have become increasingly important, given that digital services and offerings have become vital components of life. One feature in this issue details the work carried out by service providers and agencies after the massive floods that rocked our nation in January this year. A related article is on how amateur radio can provide emergency communications at times of disaster.

Other equally informative articles include an overview of the MCMC Sarawak State Office, the National Digital Identity initiative, Out of Home solutions and the Single Television Audience Measurement project.

In closing, I hope readers will benefit from the articles in this issue and understand MCMC's initiatives and functions better.

Warmest regards,
Tan Sri Mohamad Salim bin Fateh Din
Interim Chairman

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JENDELA+

A HOLISTIC INTERCONNECTION INFRASTRUCTURE

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Malaysia has been affected by the global COVID-19 outbreak, which has disrupted the people's lives. As a result, the reliance on digital technology from all parties, including the government, business, and society, has been increased, resulting in the necessity to strengthen the country's digital infrastructure ecosystem.

A robust digital connectivity ecosystem is at the heart of providing high-speed Internet access with good quality of experience that can be accessed from any location at any time conveniently. Because the Internet is one of the fundamental building blocks of economic growth, a long-term, comprehensive, and high-quality digital infrastructure is required to aid businesses to grow and, as a result, raise the socio-economic standing of the country.

The Ministry of Communications and Multimedia (K-KOMM) through the Malaysian Communications and Multimedia Commission (MCMC) implemented the Pelan Jalinan Digital Negara (JENDELA) Phase 1[1] from September 2020 until the end of 2022 to improve the level of connectivity and quality of broadband experience by providing focus on strengthening digital infrastructure across the country.

To complement JENDELA, the National Connectivity Ecosystem Laboratory (NIEL) was held virtually from 24 April to 25 June 2021, with participation from industry players and other stakeholders such as communication service providers and representatives from the relevant ministries and government agencies to exchange ideas and experiences on how to strengthen the digital connectivity ecosystem more inclusively.

An initiative known as JENDELA+ was born out of the discussions held during NIEL focusing on three (3) key aspects of digital connectivity: Hyperscale Data Centres (DC), Internet Exchange Points (IXP), and International Connectivity (IC) to ensure that Malaysia remains a competitive and attractive corporate destination for investment.

[1] https://myjendela.my/en-GB/

INDUSTRY

1. Allo technology Sdn Bhd
2. Arus Restu Sdn Bhd
3. AWS
4. Axiata Group Berhad
5. C2 consult
6. Celcom Axiata Berhad
7. Celcom Timur (Sabah) Sdn Bhd
8. China Mobile International (Malaysia) Sdn Bhd
9. Common Tower Technologies Sdn Bhd
10. CSF Group
11. Danawa Resources Sdn Bhd
12. DECIX-JBIX Malaysia
13. Digi Telecommunication Sdn Bhd
14. Enterprise Products Integration (EPI)
15. Exitra Solutions Sdn Bhd
16. Extreme Broadband Sdn Bhd
17. Facebook Malaysia
18. Green Packet Berhad
19. HeiTech Padu Berhad
20. Hexa Capital Consultancy
21. Hitachi Sunway Data Centre Services Sdn Bhd
22. Huawei Technologies Malaysia Sdn Bhd
23. iFiber
24. iSkill
25. Juniper Networks
26. Malaysia Debt Ventures (MDV)
27. Malaysian Photovoltaic Industry Association (MPIA)
28. Malaysian Solar Resources Sdn Bhd
29. Maxis Broadband Sdn Bhd
30. Microsoft
31. MSA Resources Sdn Bhd
32. MyIX
33. MyKRIS Asia Sdn Bhd
34. MyNOG
35. MyTelehaus Data Centres Sdn Bhd
36. Network Engineering
37. Northern Corridor Implementation Authority (NCIA)
38. NTT Ltd Malaysia/ NTT MSC Sdn Bhd
39. PP Telecommunication Sdn Bhd
40. Reach Ten Multimedia Sdn Bhd
41. REDtone Engineering & Network Services Sdn Bhd/ REDtone Telecommunications Sdn Bhd
42. Sabah Net Sdn Bhd
43. Sacofa Sdn Bhd
44. Sarawak Energy Berhad
45. Sarawak Information Systems Sdn Bhd
46. Telekom Malaysia Berhad
47. Tenaga Nasional Berhad (TNB)
48. TIME dotCom Berhad
49. TNB Renewables Sdn Bhd
50. TPM Technopark Sdn Bhd
51. TT Dotcom Sdn Bhd
52. U Mobile Sdn Bhd
53. Uptime Institute
54. X86 Network Sdn Bhd
55. YTL Communications Sdn Bhd

GOVERNMENT

1. Attorney General's Chambers Malaysia (AGC)
2. Department of Environment, Ministry of Environment and Water
3. Department of Fisheries, Kementerian Pertanian dan Industri Makanan
4. Department Of Occupational Safety And Health Malaysia, Ministry of Human Resources
5. Energy Commission (EC)
6. EPU, Bahagian K-Ekonomi
7. EPU, Strategic Change Management Office (SCMO)
8. Hydrographic Centre
9. Jabatan Perlindungan Data Peribadi Malaysia (JPDP)
10. Jabatan Ukur dan Pemetaan Malaysia (JUPEM)
11. Kementerian Kewangan Malaysia (MOH)
12. Kementerian Komunikasi dan Multimedia Malaysia (K-KOMM)
13. Kementerian Pembangunan Usahawan dan Koperasi (MEDAC)
14. Kementerian Perdagangan Dalam Negeri dan Hal Ehwal Pengguna Malaysia (KPDNHEP)
15. Kementerian Tenaga dan Sumber Asli (KeTSA)
16. Malaysia Digital Economy Corporation (MDEC)
17. Malaysian Investment Development Authority (MIDA)
18. Malaysian Maritime Enforcement Agency
19. Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU)
20. Malaysian Communications And Multimedia Commission (MCMC)
21. Ministry of International Trade and Industry (MITI)
22. Ministry of Transport (MOT)
23. National Cyber Security Agency (NACSA)
24. Malaysian National Security Council (NSC)
25. Northern Corridor Implementation Authority (NCIA)
26. Sarawak Multimedia Authority (SMA)
27. Unit Perancang Ekonomi Negeri, Jabatan Ketua Menteri Melaka

Figure 1: NIEL Lab Members

These three components are critical for the digital connection ecosystem to fulfil the needs of the users who are present across the chain of the ecosystem. Therefore, the implementation of JENDELA+ will ensure that a competitive digital connection ecosystem is established to realise the country's desire to become a competitive worldwide business destination of choice, with the following goals in place:

a) Hyperscale Data Centre (DC) - Cloud Service Providers (CSP) investment of RM12 - RM15 billion by 2025;
b) Internet Exchange Centre (IXP) - expansion of domestic internet exchange points in Peninsular Malaysia, Sabah and Sarawak, as well as international internet exchange points. Increasing the number of international strategic peering entities by 2025; and
c) International Connectivity (IC) - making Malaysia an international hub connecting Peninsular Malaysia and Sabah and Sarawak and making Sabah and Sarawak an international internet exchange point by 2025. As per Figure 2, submarine cables are the backbone of IC, connecting Malaysia to the rest of the world.

A total of nine (9) initiatives have been identified and divided into two (2) focus areas as follows:

a) Focus Area 1: Data Centres and Internet Exchange - the management of specialised physical space for the storage of vital applications and data, the provision of infrastructure for the exchange of Internet traffic between Internet Service Providers (ISPs) and Content Delivery Networks (CDNs), and the reduction of the need for outgoing data transit are the primary goals of data centres.
b) Focus Area 2: International Connectivity - focusing on international and domestic submarine cable systems to enable cross-border data connectivity and to establish Malaysia as an international hub via a strategic international communications network.

To achieve the established goals each initiative of the focus areas incorporates a variety of partners, including government agencies and industry. A list of initiatives and its owners can be referred to in Table 1.

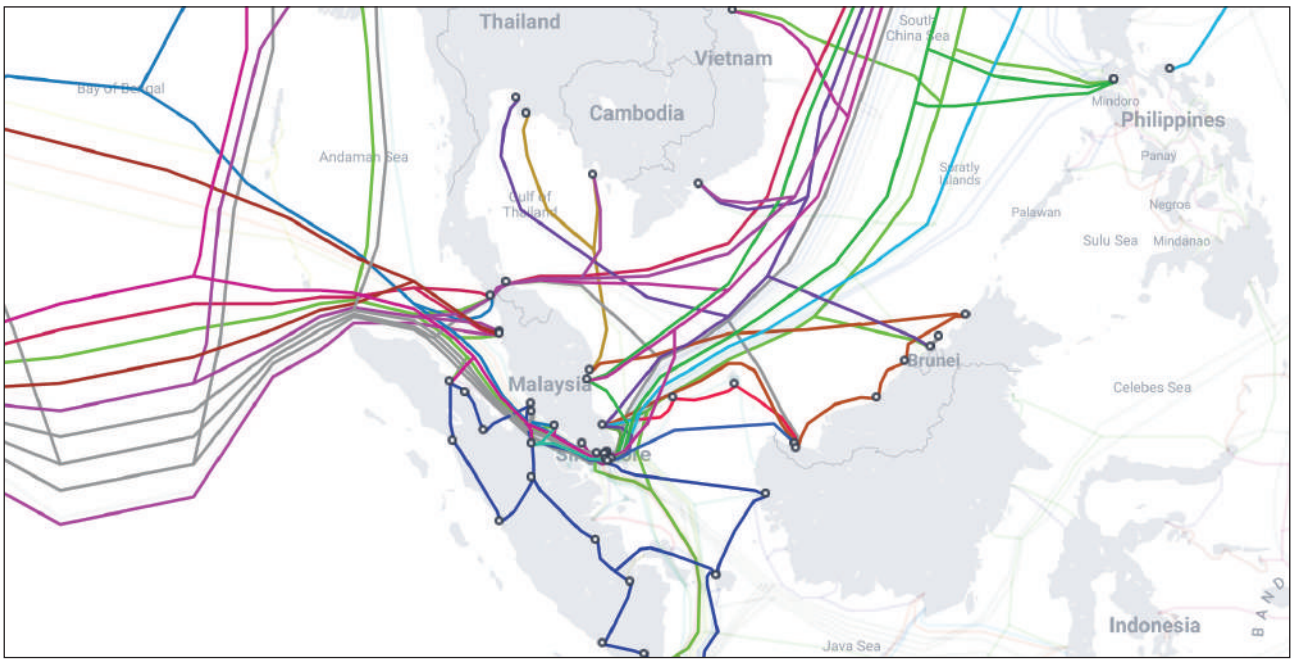


Figure 2: Submarine Cable Map[2]

No.	Initiative Description	Deliverables	Initiative Owner
1.	Renewable Energy for DCs through Third Party Access	Availability of necessary policies and framework on RE for DCs through full TPA/ sleeved PPA	MDEC
2.	Tracking DC Industry Data & Tariffs Request	Reclassification of electricity tariffs for DC based on industrial rate	MDEC
3.	Data disclosure SOPP framework	Implementation of Data Disclosure SOPP Framework for Cloud through DCs licensing	NACSA MCMC
4.	Addressing specific talent gaps in DC industry	Framework for Cloud/DCs Talent Development under MDEC's Industry Skills Platform	MDEC
5.	Industry-driven DCs Projects	New DC sites to operationalise in Malaysia: • 2 in Peninsular Malaysia. • 2 in Sabah and Sarawak	Open DC PPTel SabahNet
6.	Increasing Domestic Peering Base (PM & EM)	Recruit additional new peering / interconnection members	TM / Deutscher Commercial Internet Exchange (DE-CIX)
7.	Strategic interconnect routes and nodes for East to West connectivity	New Internet Exchange Point • 64 IXP • 2 IXP New International Connectivity • 1 new IC in East Malaysia. • 1 new route within Peninsular Malaysia	TM / DE-CIX PP Telecom MSA Resources
8.	Integrated Process for International Connectivity Approvals	Geospatial data exchange between MCMC and Pusat Hidrografi Nasional. Integration of the system / process for International Connectivity Approvals.	 MCMC
9.	Incentives Scheme for International Connectivity	Tax incentive scheme coordination through ITA	Service Providers (CDMU + TM)

Table 1: List of Initiatives under JENDELA+

[2] Source: https://www.submarinecablemap.com/country/malaysia

CLOUD SERVICE PROVIDER LICENSING

To ensure that data centres are not utilised to store fraudulent information or unsuitable content, such as those related to online gambling, pornography and so on, the licensing requirements of cloud service providers have been deliberated in great length during NIEL.

There were concerns over data security, considering the increasing use of cloud services in the daily lives of Malaysian. Cloud services are new services that require a class licence to address unregulated data security risks[3]. The licensing requirement that has been imposed effective from 1 January 2022 is aimed at ensuring data security as well as the sustainability and sovereignty of the country.

Consultations with a variety of stakeholders, including investors, were organised to address the huge misconceptions and misunderstandings about licensing. The high licence costs based on licence category and the need for Universal Service Provision (USP) contributions in licences[4] issued by MCMC are major sources of concern for investors.

IMPLEMENTATION OF JENDELA+ AND SUPPORT BY THE MINISTRIES AND AGENCIES INVOLVED

To ensure that JENDELA+ implementation is accomplished within the set targets and timeframes, it is essential that the program is planned and coordinated effectively.

The implementation of JENDELA+ also requires participation and commitment from all parties that have been identified which include ministries and government agencies such as the Ministry of Energy and Natural Resources (KeTSA), Ministry of Domestic Trade and Consumer Affairs (KPDNHEP), National Security Council (MKN), National Cyber Security Agency (NACSA), Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), and Malaysian Digital Economy Corporation (MDEC), as well as telecommunications service providers, content providers and data centre industry players.

In other words, all parties engaged, whether government or private sector, must play a key role in ensuring that all approved initiatives are successfully implemented to accomplish the JENDELA+ implementation goals and promote the Digital Transformation aspirations in MyDigital.

JENDELA+ GOVERNANCE AND IMPLEMENTATION MONITORING

The Central Monitoring Office 1 (CMO1) at MCMC has been tasked to monitor closely the implementation of initiatives under JENDELA+ through the JENDELA Implementation Committee platform. This platform has been in place since the implementation of JENDELA in September 2020. The existing JENDELA governance structure has been expanded with the addition of initiatives under JENDELA+.

[3] Why MCMC imposed the regulation on cloud services? - https://www.mcmc.gov.my/skmmgovmy/media/General/pdf2/FAQ-Regulating-Cloud-Service.pdf

[4] Regulation 27 of the USP Regulations requires all licensees (except for Content Applications Services Providers (CASP) licensee holder), whose weighted net revenue derived from the designated services for the previous calendar year exceeds minimum revenue threshold of RM2 million to contribute 6% of the weighted net revenue to the USP Fund

Although JENDELA+ implementation has just commenced in Q4 2021, there are some key achievements recorded in 2021 as outlined below:

a) The Minister of Communications and Multimedia Malaysia announced a licensing requirement on the provision of cloud services beginning January 1, 2022. The services are regulated by MCMC under the light touch regulation[5] approach under the CMA 1998; and
b) Completion of 32 nodes as part of the targeted 66 Internet Exchange Points (IXP) in Malaysia by Q4 2023.

A comprehensive and competitive digital ecosystem has been a long-standing commitment of both the Ministry, represented by MCMC, and industry to make Malaysia the preferred destination for foreign investors. In addition, the implementation of JENDELA+ would boost the country's digital connectivity ecosystem and further increase the capabilities of digital technology, which will contribute to the achievement of the country's digital transformation.

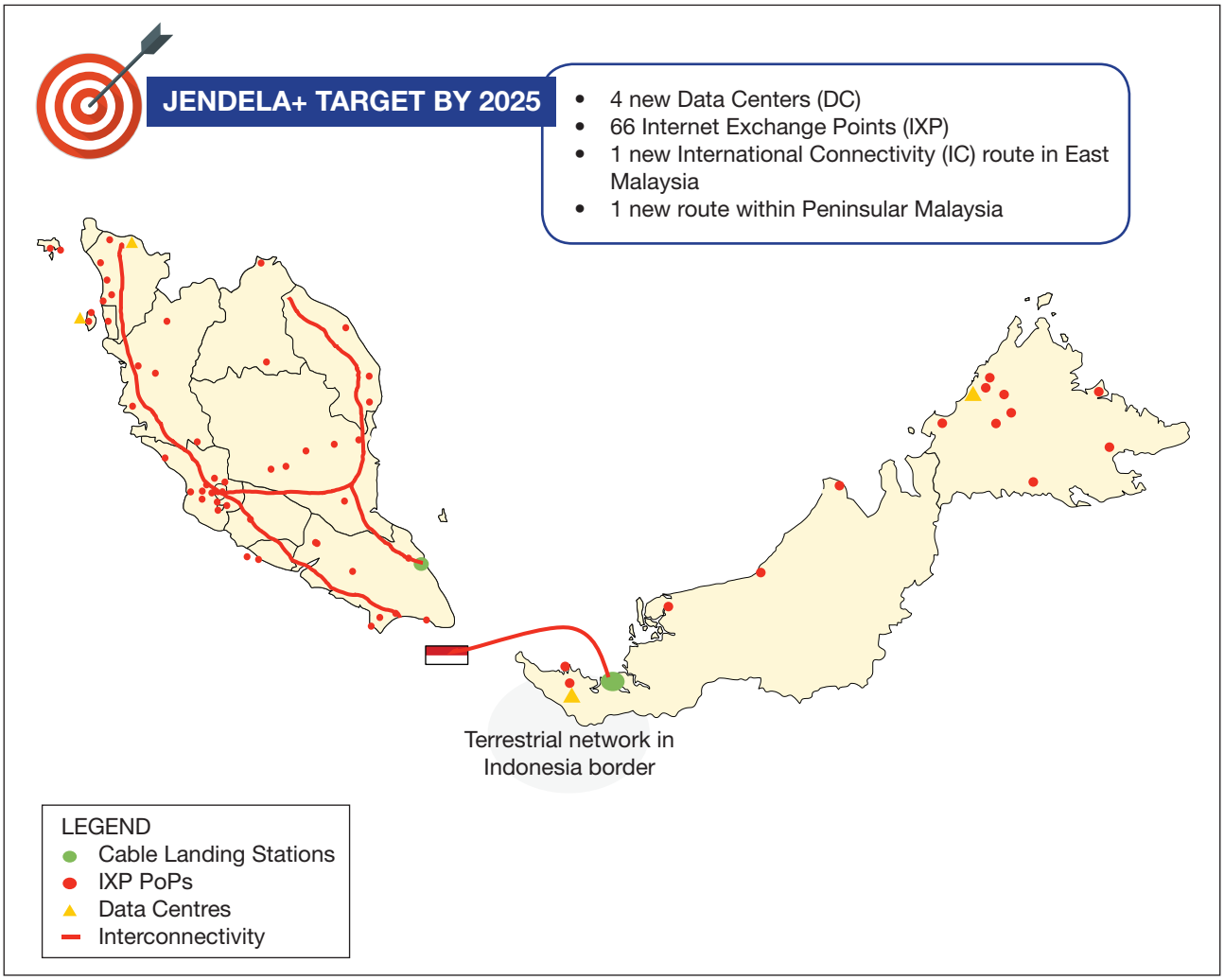
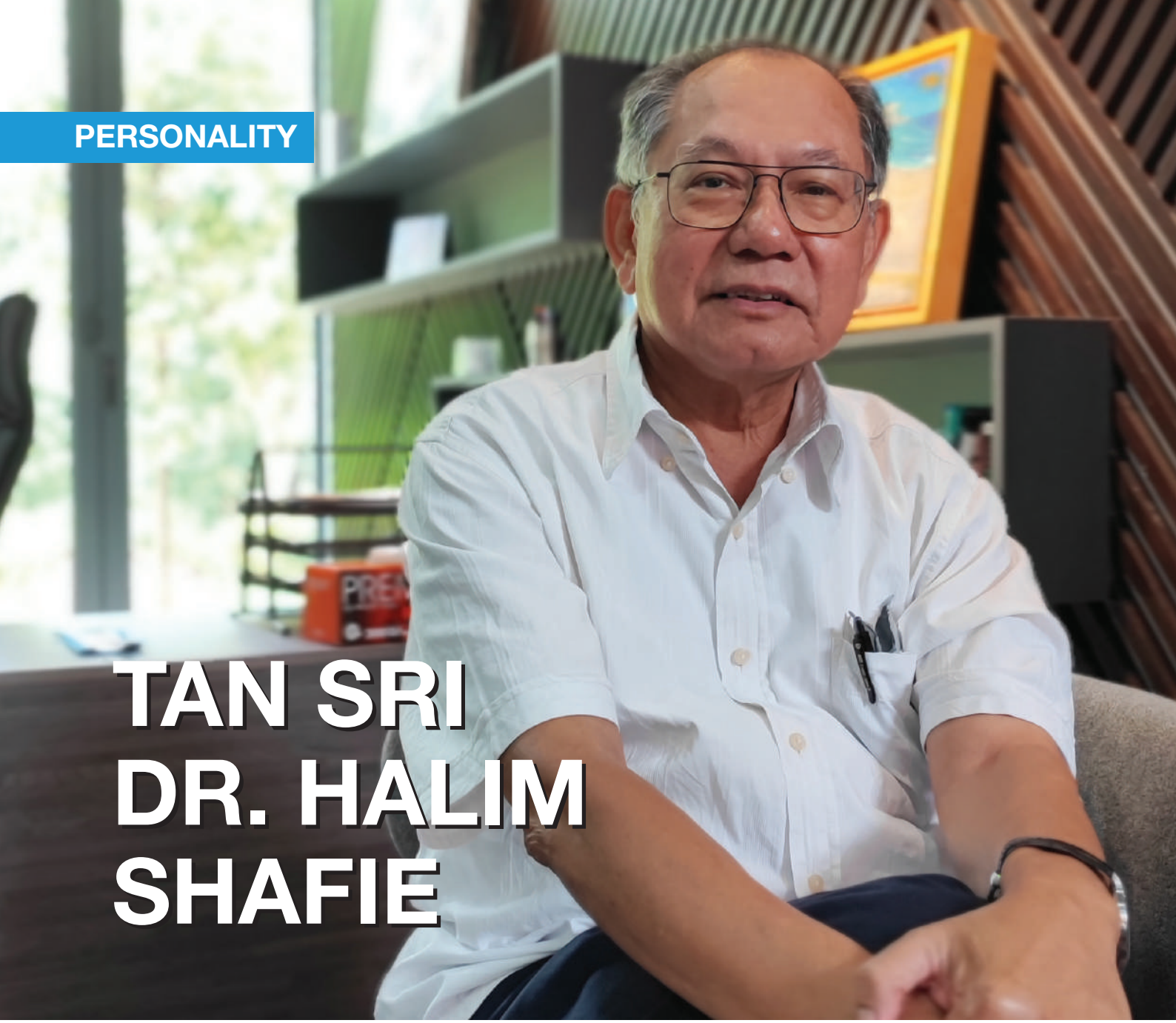


Figure 3: Overall target under JENDELA+ by 2025

[5] https://www.mcmc.gov.my/skmmgovmy/media/General/pdf2/Info-Paper-Regulating-Cloud-Service.pdf



TAN SRI DR. HALIM SHAFIE

Over his long and distinguished career in government, regulator and private sectors, Tan Sri Dr. Halim was appointed MCMC Chairman twice, in 2006 and 2015. In this issue of .myConvergence, he shares his story and thoughts.

Where did you grow up?

I grew up in Kuala Ketil, a small town in Kedah surrounded with rubber estates. I was in the inaugural batch of an English school but there was no physical school for it yet. The first year, we shared with Sekolah Tamil Batu Pekaka and in our second year we shared with Sekolah Melayu Kuala Ketil. It was only in Standard 6 that we had our own school, newly built. At that age, school was all about games. We looked forward to playing football every chance we got – before class, at recess and after school. The Sekolah Tamil Batu Pekaka had an excellent football field and I developed close friendships with my classmates that has lasted till now.

Tell us a bit about your later education

My secondary education was at Malay College Kuala Kangsar. Later, I attended the University of Malaya, and graduated with a Bachelor of Economics (Hons). I completed my Master in Economic Development from the University of Pittsburgh and later my PhD in Information Transfer from Syracuse University, USA.

I also did short programmes. The most memorable programme was at the Indian Institute of Management (IIM), Ahmedabad which had excellent professors. Our course director was the late CK Prahalad. He went on to become a top management guru, a distinguished author, and was later professor at the University of Michigan's Ross School of Business. Then there were Prof. Labdhi Bhandari who was a widely respected authority on Marketing in India, Dr VL Mote, a top mathematician, Prof SK Bhatacharya as well as Dr Mohan Kaul who taught us IT. I also did a short programme at Harvard later, but it

was IIM that had a strong impression on me. The fact that I can remember the names of my professors tell you how good they were.

Where has your career path taken you over the years?
I joined the Government Service in 1972. I started my career in the Ministry of Education, followed by appointments at the National Institute of Public Administration (INTAN) in 1976.

One initiative that I am particularly proud to be associated with at that time was the setting up of the National Computer Training Centre (NCTC) at INTAN. The late Datuk Dr. Shaari Ahmad Jabar who was the Director then was very visionary. He felt that we needed a computer training centre in the country. He asked me to prepare a paper that he presented at the first MNCC conference. The response was good and we later sent a paper to the Public Services Department and it approved the setting up of the NCTC.

My connection to the IIM in Ahmedabad became useful. We made a request to UNESCO to assist us in getting Dr Mohan Kaul, my professor at IIM to come and help set up the computer training centre. Our request was successful and Dr Mohan helped shape the NCTC. The move to Malaysia was good for him too. I left INTAN in 1983 for my PHD. When I came back in 1988, Dr Mohan had gone on to become a senior official at the Commonwealth Secretariat in London. I was happy that I was involved in the creation of something of impact, although the credit for the NCTC must go to the vision of the director at that time.

Careerwise, I was head of IT in MAMPU, then Director of INTAN. I then went on to the Ministry, first as Deputy Sec Gen, and then in 2000, I became Sec Gen. There I met a fabulous man by the name of Leo Moggie who was very passionate about bridging the digital divide.

The Ministry days – Bridging the digital divide
In my times at the Ministry and MCMC, I was privileged to work with so many Ministers. I worked under Tan Sri Datuk Amar Leo Moggie, the late Tun Dr. Lim Keng Yaik, Datuk Seri Shaziman Mansor, Tan Sri Dr. Rais Yatim, Datuk Seri Ahmad Shabery Cheek, Datuk Seri Salleh Said Keruak and finally YB Gobind Singh.

Tan Sri Leo Moggie was Minister when I was at the Ministry. The digital divide back then was very wide. Mobile and fixed penetration were very low, both were only over 20 percent. Leo Moggie was very concerned about this. He gave us a challenge. He said that if we could put communications in the Bario highlands, which is among the most remote areas in Sarawak, then we should be able to put it anywhere in Malaysia. We took up the challenge. We worked with TM and put in communications using VSAT.

The Kelabit people who lived in Bario were very receptive. A lecturer from University Malaysia Sarawak by the name of Josephine Balang was from Bario and she was very passionate about bringing development to her homeland. She worked with TM and Mimos and got the internet centre running. When we launched it, a local headmistress spoke at the launch. She said that for the first time in the history of the Bario people, they could make calls from Bario. This was a big thing for them because previously, they had to fly to Miri if they wanted to make a call. And it must be noted that the Kelabit diaspora is very spread out in Malaysia and the rest of the world. They could now speak to their folks at Bario.

In those years, we did a lot of work to address the digital divide. We put internet and communications wherever we could, often at health centres, rural libraries and schools. In fact, the precursor of the Bestari net project was started at that time. It was different from the later Bestarinet project in that we worked with whichever service provider - fixed or mobile - that could address the communication needs. And wherever fixed lines were present we used those, and they were very stable. We typically put in 4 ports, which allowed us to put a line outside the school for the community to use. This was very useful for those areas as they had nothing there previously.

I remember visiting one school in remote Pitas with the Chief Education Officer of Sabah. What was interesting was that the headmaster there told the education officer that previously it used to sometimes take months for him to get circulars from the education ministry. Now he could access the education ministry portal and get circulars immediately. It was a very vivid example of what even the most basic of internet was doing in rural areas.

There was a lot of regulatory work carried out under Leo Moggie too. One major accomplishment was the sharing of towers. The concept was very new then, and there was a lot of resistance from the industry that was used to having their own territories. I pointed out to them that the industry works on the law of increasing returns, not diminishing returns. For example, in an organisation if only 2 people had communications access, it does nothing. If more terminals and users were added, imagine the difference it would make to the organisation. This would be the same for the nation when everyone could have access to communications.

The first MCMC stint
I became MCMC Chairman for the first time in 2006. The late Tun Lim Keng Yaik was Minister then. The focus then was on prepaid registration which was completed by December 2006. Then we embarked on Mobile Number Portability which was completed at the end of 2007. Another major project was National Internet Exchange to keep internet data in the country rather than have it exchanged between Malaysian telcos in Singapore.

But the biggest project under Tun Lim Keng Yaik was the High Speed Broadband (HSBB) which TM successfully completed with 1.3 million home passes in 2012 under the public private partnership between the Government of Malaysia and TM. The HSBB project put Malaysia ahead of other ASEAN countries except for Singapore in fibre connections in 2012.

The second MCMC stint

I came back to MCMC for the second time at the request of Minister Shabery Cheek. I was comfortable at TM when he called me. I thought it was to discuss the flooding in Kemaman, which had occurred then. Instead, he asked about my views of MCMC and later asked me to become MCMC Chairman again. I was a bit reluctant but, in the end, as a former government servant, and when asked to do public service, it is difficult to say no.

When I came back in 2015, the first thing we did was to review both legislations that relate to MCMC, namely the Communications and Multimedia Act 1998 and the Malaysian Communications and Multimedia Commission Act (1998). I must highlight that the Acts have served us very well for over 20 years. My brief to the consultants that we engaged was that the proposed revisions should last for at least 15 years. The reviews were done, revisions were made and approved by all relevant bodies but unfortunately there was a change of Minister followed by a change in Government and to this day, the proposed revisions have still not been tabled. The Acts that have served us well need refresh in areas such as network security, competition as well as MCMC's governance.

What do you do these days?

It is more leisurely these days for me. In 2020, I was invited to become an Axiata board member. I was a bit reluctant due to age. What made me take up the offer was the chance to work in the mobile side of the industry. I have already had experience in policy making, regulating the industry and in fixed lines at TM. So the opportunity to experience mobile was difficult to resist.

I was also made chairman of SMART in Cambodia and it is a privilege to learn how mobile companies operate in other countries. Recently I was also made interim chairman of Celcom.

At MSD Innovations, the company I am also involved with now, we are working on interesting projects. The company's objective is to align itself with the government's agenda in terms of digital transformation, specifically in the areas of IoT. Our focus is in 3 areas - agriculture, environment and healthcare. The organisation is much like a social enterprise, with aims to contribute to society.

For environment we have implemented flood warning projects at Kota Belud, which has become very flood prone after the earthquake at the Kinabalu area. Our IoT sensors can track floods from rivers at the base of the mountain all the way to Kota Belud. We also have done some work for flash floods for the Subang Jaya local authority MBSJ that can help detect flash floods and allow their mobile teams to alert the population.

We also have done some trial projects for smart farming. We have five farms currently, both indoors and outdoors, with a showcase project at MMU in Cyberjaya.

Our healthcare projects are fairly new. We are working with another company to explore setting up online healthcare. All this keeps me intellectually engaged.

What do you hope to see happen in the telecommunications sector?

From the communications perspective, I would like to see a lot more done in convergence services and access across the nation. There is convergence at TM and Maxis but I think there is a lot more that can be done. We need to make it easy for citizens and SMEs to access services.

While we have achieved a lot in the bridging of the digital divide, we need to do it again as with 3G decommissioned, we have to get 4G into rural areas.

It is about the people. Every kid has potential. I learned this when we did a project called Cyberkids in Sabah and Sarawak. We got kids together from rural areas in a camp environment. 10 kids and 2 teachers from each school were brought in. We hoped that they would learn about IT and become catalysts and change agents when they went back to their schools. We gave them the goals of setting up a computer club and a school website. And in the programme, I saw that these rural kids had so much potential. I was always impressed with their presentations.

There was one kid who was in Year 5. He had a bit of physical disability. Nonetheless he displayed such leadership capabilities that he was appointed the leader in the camp. Sometime later, I visited a school in a very remote area. I was pleasantly surprised to find that kid there greeting us.

I would love to see all kids, no matter where they come from, having the same opportunities to achieve their full potential. .my

5G IS FINALLY HERE, AND THE JOURNEY HAS BEGUN

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Malaysia has a fifth-generation (5G) cellular network now. What exactly is 5G? Is it simply the evolution of the 4G network or emerging technologies that may cause a technological and industrial revolution? As wireless broadband technology evolved from generation to generation, mobile communication applications have shifted from basic voice telephony to empowering a wide range of verticals technologies across various industries that provide consumers with high quality, innovative and friendly services. They are expected to continue to grow and occupy an integral part of our lives and ultimately transform societies.

The fourth generation of mobile communication technologies has created a diverse foundation for various Mobile Broadband applications. The increasing potential for disruptive vertical applications with very high deployment densities was one of the main motivators for the development of the next generation of mobile communication systems, the International Mobile Telecommunications-2020 (IMT-2020), also known as 5G or the fifth generation of mobile communications systems. Other motivators included rising demands for upgraded mobile broadband services and the enormous potential for mobile communications to provide ultra-low latency and ultra-high reliability at higher frequencies.

THE POTENTIAL OF 5G

Behind 5G's faster speed, lower latency, higher capacity, and improved reliability, lie new and unfamiliar technologies like mmWave, massive MIMO, and adaptive beamforming, all of which will demand substantially more powerful base stations and customer devices. The possibility for mmWave transmission coupled with adaptive beamforming, which necessitates a vast number of antenna elements, is the most significant change to the 5G physical layer. mmWave transmission is a well-known technology for point-to-point line-of-sight wireless backhaul. Using those frequencies in a cellular topology, where each cell serves hundreds and thousands of mobile users, many antennas will be integrated into advanced device packaging.

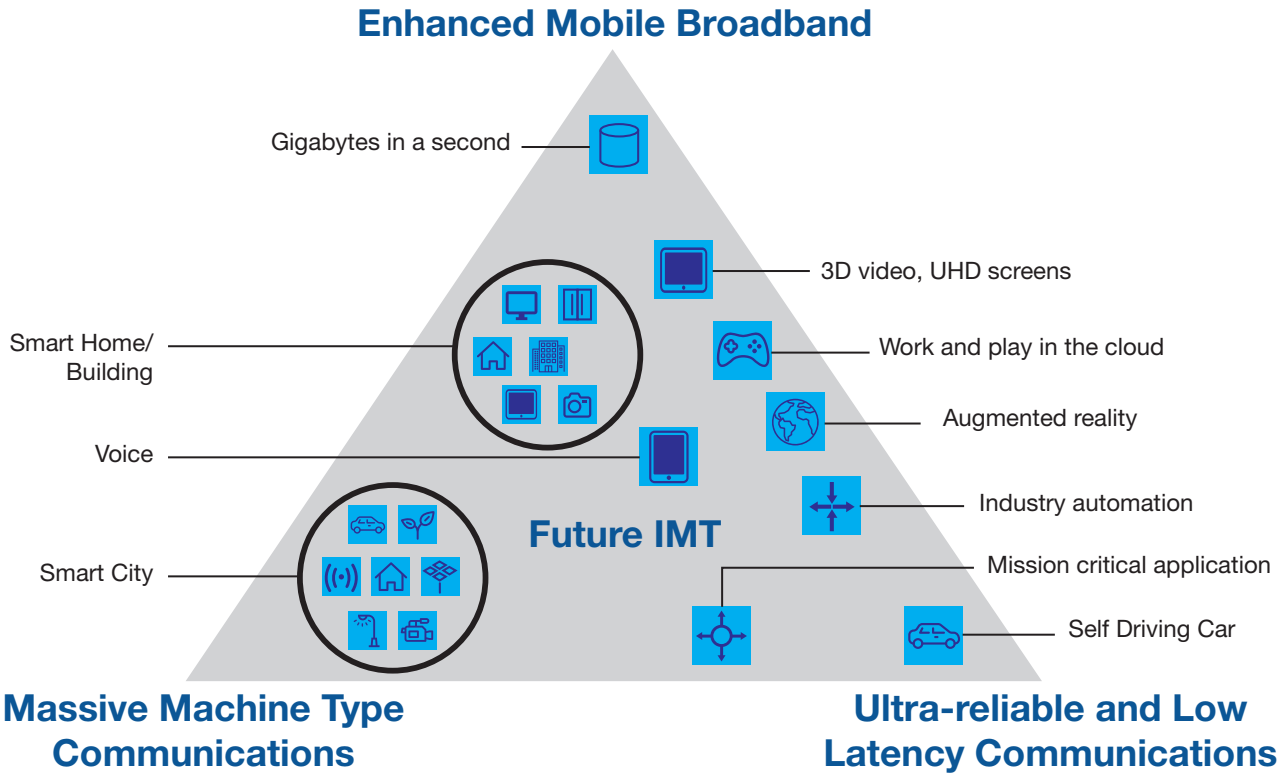

Figure 1: Triangle of applications

Furthermore, 5G is aiming for more than just faster data rates. It aspires to provide a broader range of applications and innovations that future generations of mobile communication systems can handle. These are generally grouped under the triangle of applications, as shown in Figure 1.

The hunt for higher data rates and more system capacity is summarised as enhanced mobile broadband (eMBB). ultra-Reliable Low Latency Communications (uRLLC) is another main driver that has enabled multiple new services and vertical markets like augmented, virtual reality, self-driving cars, and Industry 4.0. Massive machine-type communication (mMTC) completes the triangle which can benefit future generations. All of these applications have unique requirements and prioritisation for their key performance metrics in various ways. This is a hurdle because the diverse criteria and priorities must be addressed concurrently with a one-size-fits-all technology.

Digital transformation can fundamentally change our society, business, and daily lives. Despite the rapid progress in recent years, we are still in the early stages of a journey enabled by ubiquitous computing, storage, computational power, and networking. Mobile networking is the critical enabler of this transformation. Therefore, with the rapid deployment of 5G, digital transformation can be accelerated. Businesses were able to innovate and improve existing products, services, and business processes by integrating 5G into the innovations and improvements. For example, we can see that from manual automotive to smart manufacturing and utilities. The role of interconnecting machines, sensors and systems with mMTC will override the limitation of previous technologies and eventually will grow in importance, transcending almost every industry.

THE 5G ROLLOUT

The country prioritises progress towards 5G as competition for investments among other countries in the region is fierce, especially as all countries attempt to recover their economies from the effects of the COVID-19 pandemic. Malaysia's 5G groundwork began in 2018 with the formation of the National 5G Task Force, which include 114 members from several agencies, including service providers. This was followed by the 5G Demonstration Project (5GDP) in 2019, which covered eight verticals and 70 application cases. 5G readiness is required to ensure Malaysia has the solid foundation to remain competitive. There is an ongoing plan in the current 5G rollout paradigm to mitigate the risk of the digital divide in Malaysia. This plan intends to attain 80% coverage in populated areas by 2024, with service quality of 100Mbps at the cell edge. The vast rollout of 5G technology will provide an attractive infrastructure for investors to invest in the country and, in turn, make Malaysia a competitive nation.

The country is undergoing digital transformation, and we must ensure that Malaysia is future-ready in order to realise its goal of becoming a high-income, technology-based economy. According to the MIER 2019 research, the 5G rollout will stimulate Malaysia's productivity and economic growth. It is expected to bring in RM12.7 billion to Malaysia's GDP over the following five years. The

workforce landscape will shift towards higher-valued jobs since humans will still need to make the ultimate decisions. Furthermore, the use of Artificial Intelligence (AI) will help individuals make more accurate and effective decisions that can leverage computers and machines to mimic the problem-solving and decision-making abilities of the human mind. A fundamental shift in the talent landscape will emphasise a knowledge-intensive workforce and new capabilities. Due to prevalent anxiety that automation will result in wage cuts and job losses, it is perhaps simplistic to link automation, employment, and wages. This is because while automation will displace existing jobs, it will simultaneously create new opportunities for other people to learn and explore. The job opportunities created through 5G technology will be higher paying beneficial jobs than those lost by automation. Engineers and software developers will be in exceptionally high demand as 5G and automation become a reality. This is because process automation, Internet of Things (IoT) and big data are required to enable the new technology.

Personal assistants like Amazon's Alexa and Google Home offer prospects for more comfortable living. The same idea has been expanded into Smart Cities, which are considered the future of urbanism. These cities will connect infrastructure and technology on a previously unknown scale, boosting inhabitants' quality of life and the way they interact with their surroundings. 5G is critical for the smart city concept since it is an enabling technology for IoT. It will play an essential role in collecting information via sensors, which will be transferred to a central monitoring point in real-time. Edge computing is another 5G-based technology that will impact smart city projects. Edge computing is an architecture that provides computing and storage capabilities for applications at the network's edge. In contrast, in traditional centralised network architectures, latencies were caused by traffic travelling through the entire network to a central point and then back to the end-user hardware.

INDUSTRY AND MOBILITY IMPACT

5G will significantly impact industry and mobility, and its applicability will go beyond consumer mobile broadband. Moreover, 5G will enable manufacturers to virtually build up or shut down new product lines or entire facilities and automate end-to-end processes. Manufacturers can achieve enormous productivity improvements with billions of sensors, machine-controlled robotics, and autonomous logistics, all of which can communicate and function remotely in real-time over 5G. Unquestionably, 5G will be the platform that enables growth and change across a wide range of industries, thereby contributing to social and economic progressions. People and machines will be able to collaborate more efficiently with ultra-low latency, mMTC, and intelligent analytics which will also allow real-time machine control. This allows the workforce to move more freely and away from heavy machinery, which will increase safety. Furthermore, because of the vast interconnections, all devices could interact with one another, delivering continual updates to the systems in real-time.

5G will also be critical in providing the wireless connectivity required to run new Smart Factories, with enormous mMTC, real-time control of machines, robot/human interactions, and edge cloud analytics. This digitisation relies heavily on IoT technologies, cloud solutions, big data crunchers, and cyber security components. Furthermore, 5G technologies have the potential to play a critical role in merging various technologies and providing a unified platform for interconnecting machines, robotics, processes, self-driving vehicles, commodities, remote workers, and so on. The system's efficiency and adaptability are increased by efficiently combining various technologies and extracting data for action. 5G technologies will be critical in enabling all communication scenarios, as they provide mobility and a seamless service experience. This function of 5G technologies correlates exceptionally well with the 5G goal of integrating networking, computing, and storage resources into a single programmable and unified infrastructure. This unification will enable more efficient and dynamic use of all distributed resources and the convergence of fixed, mobile, and broadcast services.

Subsequently, with its quicker and more reliable communications between machinery, sensors, and computing systems, 5G will increase flexibility in industrial operations, culminating in real-time flexible automated manufacturing processes, which would result in increased overall productivity. Wireless connectivity makes it easier to change manufacturing floor machinery to meet changing demands. Automatic information and data sharing across the industrial life cycle may also increase overall efficiency and productivity. These are made possible by 5G's ultra-low latency and high dependability. Enabling virtual reality and augmented reality communication between field people and factory and product specialists can improve maintenance and repairs. With 5G, it will be possible to host crucial servers in the cloud, allowing for smooth maintenance and upgrades without visiting the factory, and thus improving staff safety.

As a result, 5G will enable the Industry 4.0 factory of the future. This will allow producers to virtually put up or shut down new product lines or whole factories and automate end-to-end processes. To fully realise the promise of 5G in the Industrial sector, professionals from each industry must work together proactively and efficiently. This is the key to delivering new possibilities to the market. Cross-industry collaboration is required to establish the overall 5G architecture that considers the larger ecosystem's needs. .my

PEDi : EMPOWERING THE COMMUNITY TOWARDS THE DIGITAL ECONOMY

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The Covid-19 pandemic has been the turning point that led to a surge in e-commerce and boosted most aspects of digital transformation. Amid slowing economic activity, more and more businesses and consumers have gone digital, providing and purchasing more goods and services online. Consequently, a reliable and stable Internet connection has become vital in order to facilitate interaction between people, organisations and devices. The implementation of the national digital infrastructure plan, known as Jalinan Digital Negara (JENDELA), and recognition of the Internet as the third utility as well as the introduction of Malaysia Digital Economy Blueprint (MyDigital) has put Malaysia on track to embrace the digital economy in its journey towards becoming a digital nation.

PEDi'S IMPACT ON THE COMMUNITY

Pusat Ekonomi Digital Keluarga Malaysia (PEDi), formerly known as Pusat Internet Komuniti (PIK), is fully funded by the Malaysian Communications and Multimedia Commission (MCMC) through the Universal Service Provision (USP) Fund since its operation in 2007.

Each PEDi is equipped with 20 units of computers, out of which 10 units are provided in the Internet surfing room while the other 10 units are located in the training room. Every PEDi is also equipped with ICT equipment such as a printer, a fax machine, lamination machines, scanners, a binding machine, an LCD projector and an LED television as well as air-conditioned space for the comfort of users. PEDi is open daily except on public holidays and is managed by two full-time supervisors who assist and support visitors. The two supervisors at PEDi are fundamental to change by engaging and training the local community. Their main roles are to guide and teach basic ICT skills and entrepreneurship to the local community and thus encouraging them to adopt digitalisation in their daily lives and business operation.

Since 2016, the main programmes initiated at PEDi for the benefit of the local community comprise ICT related training, entrepreneurship, multimedia and e-learning. As

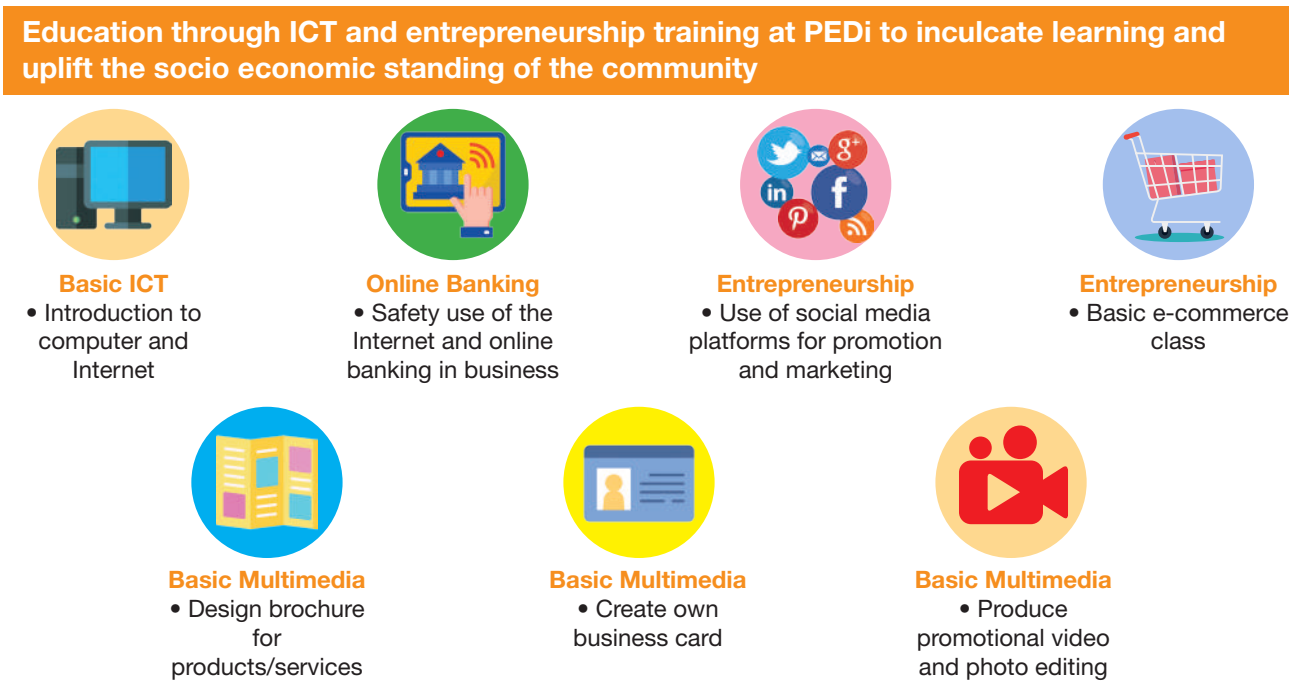

Figure 1: Some of the Basic ICT and Entrepreneurship Classes Offered at PEDi

consumers are moving towards digitalisation especially through e-commerce and online banking, PEDi has always remained relevant to the local community by offering digital entrepreneurship training for entrepreneurs. As of 31 August 2022, PEDi has produced up to 25,136[1] active online entrepreneurs and recorded more than 3.1 million[2] training participation among local communities through various learning programmes including ICT and entrepreneurship. As of Quarter 1 of 2022, a population of 18.9 million reaped the benefits from the variety of services and facilities offered at all 911 PEDi throughout the country.

WHAT IS A DIGITAL ECONOMY?

Malaysia defines digital economy as economic and social activities that involve the production and use of digital technology by the individual, business and government[3]. The impact of the digital economy is wide-ranging and transformative, in which it is able to influence society, the community, business and government. The digital economy has created opportunities for people to participate as gig workers, for new business models to offer new products and services, for local products to be marketed and sold via e-commerce platforms and for improved public service delivery by the government[4].

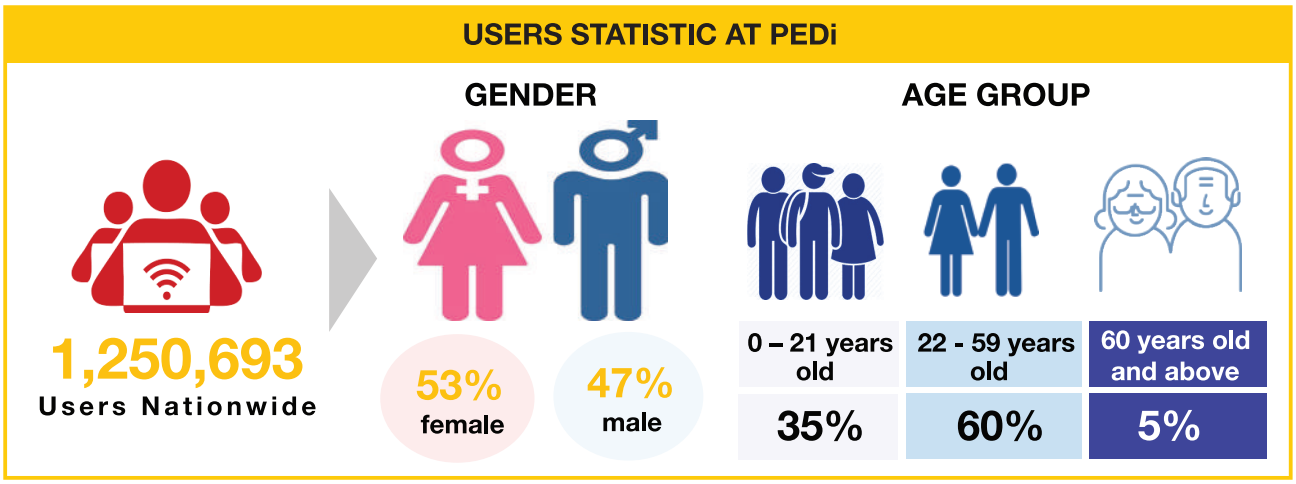

Figure 2: The Users Statistics at Pusat Ekonomi Digital Keluarga Malaysia as at 31 August 2022

[1] Source: Analysis from the Designated Universal Service Providers (DUSP) data gathering from year 2020 until 31 March 2022
[2] Source: https://cims.skmm.gov.my
[3] Source: Malaysia Digital Economy Blueprint 2021
[4] Source: Malaysia Digital Economy Blueprint 2021

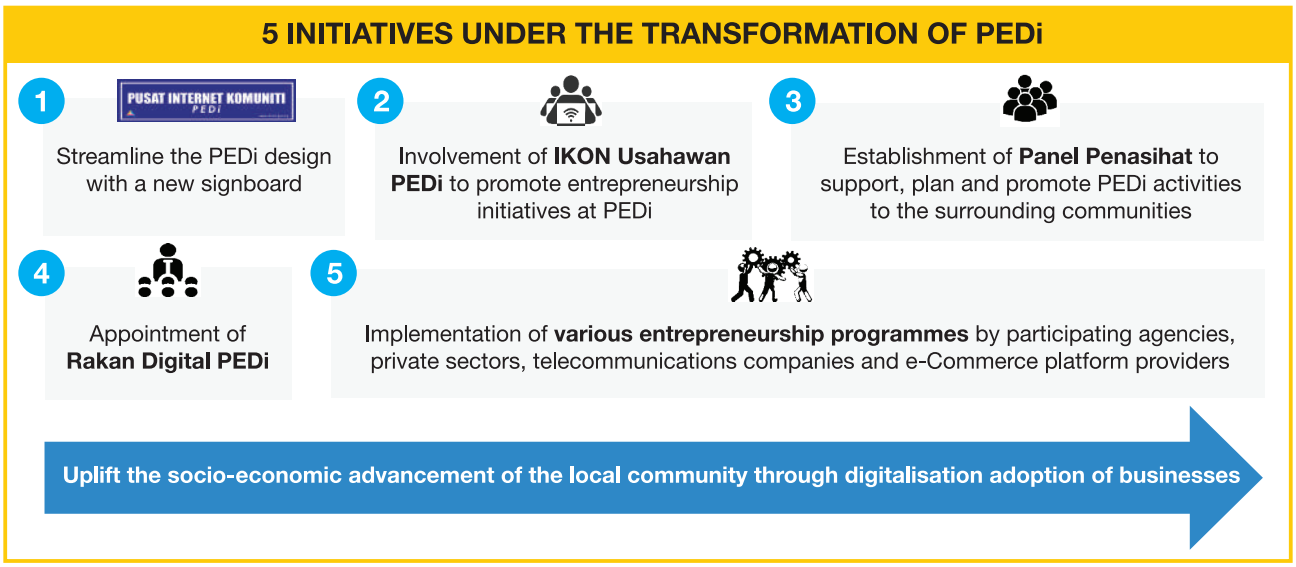

Figure 3: The Initiatives under the Transformation of PEDi

PEDi AND ITS TRANSFORMATION FOR THE COMMUNITY

Moving forward, MCMC has transformed its PEDi to become community digital economy and learning centres with the aim to empower the local community towards a digital economy.

In 2021, the role and function of PEDi has been strengthened and transformed with 5 key initiatives that aims to uplift the socio economy of the local community through adoption of digitalisation in their businesses.

The PEDi transformation plays a prominent role in helping to increase e-commerce activities, especially among rural communities. The newly transformed PEDi was launched and officiated by the YAB Prime Minister, Datuk Seri Ismail Sabri Yaacob on 21 November 2021 at PEDi Kampung Durian Tawar, Bandar Bera, Pahang. As mentioned earlier, to support the government's effort in digitalisation, PEDi has now been transformed from providing basic connectivity to the rural and under-served areas to become community digital economy and learning centres with the aim of empowering the local community towards innovative and competitive digitalisation of businesses.

CAPACITY BUILDING OF THE DIGITAL ENTREPRENEURS

In June 2021, a comprehensive digitalisation initiative called *Program Pemerkasaan Pendigitalan Usahawan Kecil* (Pupuk) was introduced to empower and help entrepreneurs engaged in the digital economy and

ANNOUCEMENT BY FORMER Y.A.B PRIME MINISTER ON 28 JUN 2021	INITIATIVES UNDER PUPUK	TARGET
"Bagi menyokong agenda digitalisasi dan menggalakkan urusan transaksi tanpa tunai, Kerajaan telah membangunkan **Program Pemerkasaan Pendigitalan Usahawan Kecil atau PUPUK** sebagai inisiatif menyeluruh" "Bagi menggalakkan penyertaan usahawan mikro menceburi platform e-dagang melalui program **Pemerkasaan Pendigitalan Usahawan Kecil** yang diterajui MCMC, kerjasama strategik antara penyedia platform digital, syarikat telekomunikasi serta Pusat Internet Komuniti akan diperkasakan."	• **15** entrepreneurship programmes. • **600** Rakan Digital will be hired to facilitate and provide entrepreneurship training programmes under Pupuk.	**Timeline:** 2021- 2025 **Target:** 800,000 micro entrepreneurs
	COLLABORATION	**TOUCH POINTS FOR PUPUK**
	Lead by: MCMC **Participating Agencies:** • Suruhanjaya Syarikat Malaysia (SSM) • Malaysia Digital Economy Corporation (MDEC) • MYNIC Berhad • Human Resource Development Corporation • Institut Keusahawanan Negara Bhd (INSKEN) • Perbadanan Nasional Bhd (Pernas) • SME Corporation Malaysia **Private Partners:** • Telekom Malaysia • AEON • Shopee	PUSAT EKONOMI DIGITAL KELUARGA MALAYSIA TMpoint UTC PUSAT TRANSFORMASI BANDAR INSKEN INSTITUT KEUSAHAWANAN NEGARA

Figure 4: Overview of Pupuk Programmes

Figure 5: Initiatives under Pupuk by Participating Agencies

to promote the adoption of business digitalisation. Pupuk offers training and mentoring opportunities to the community around PEDi especially the existing local entrepreneurs to increase their sales revenue by venturing into online business through e-commerce platforms. It aims to provide employment opportunities to the surrounding community through various economic digitalisation programmes and the creation of a digital literate community that further bridges the digital divide between urban and rural communities.

MCMC continues to play a proactive role in further enhancing the digital adoption of businesses with additional 600 manpower at selected 600 PEDi nationwide. As of 31 July 2022, a total of 521 Rakan Digital PEDi have been appointed by the Designated Universal Service Providers to assist various entrepreneurship programmes under Pupuk as well as hand-hold local entrepreneurs in adopting digitalisation of their businesses. It is targeted that by end of 2022, a total of 600 Rakan Digital PEDi will be hired. *IKON Usahawan* from all the PEDi will also support to strengthen the role of PEDi in inspiring and spurring e-commerce among local entrepreneurs.

Programmes under Pupuk are implemented through the touch points at 600 selected PEDi nationwide. Other touch points for activities under Pupuk are the Urban Transformation Centre (UTC), TM Point and the Institut Keusahawanan Negara Berhad (INSKEN).

The implementation of programmes under Pupuk is done through a smart partnership and strategic collaboration with the participating agencies, the private sector, telecommunications companies, and e-commerce platform providers. As of 31 December 2021, 10 out of 15 programmes identified under Pupuk have been successfully implemented.

PUPUK@SHOPEE PROGRAMME BY MCMC

Pupuk@Shopee is one of the signature programmes under Pupuk initiated by MCMC. MCMC is working closely with Shopee, an e-commerce platform partner, to create business opportunities and promote PEDi entrepreneurs and products in online markets. The Pupuk@Shopee programme campaign was launched on 29 June 2021. The campaign targeted at least 1,000 entrepreneurs from PEDi to onboard during this period with an estimated 10% increase in the income of the participating entrepreneurs. Through the programme campaign, Shopee has developed a dedicated microsite for PEDi entrepreneurs to be featured as preferred sellers in their platform. There are attractive categories featuring PEDi entrepreneurs from food to fashion and technology, making it a one-stop centre for consumers to support rural sellers. Funding from MCMC has been allocated to entrepreneurs from PEDi (as the sellers) in the form of platform discount vouchers, store vouchers, free shipping and cash back for all the products from the PEDi, as incentives to encourage consumers to buy from sellers.

The Pupuk@Shopee programme has received very encouraging response from entrepreneurs in PEDi. In total, from the period of 29 June to 31 December 2021, the sales revenue recorded for the Pupuk@Shopee programme was RM11.8 million, resulting in 14.8

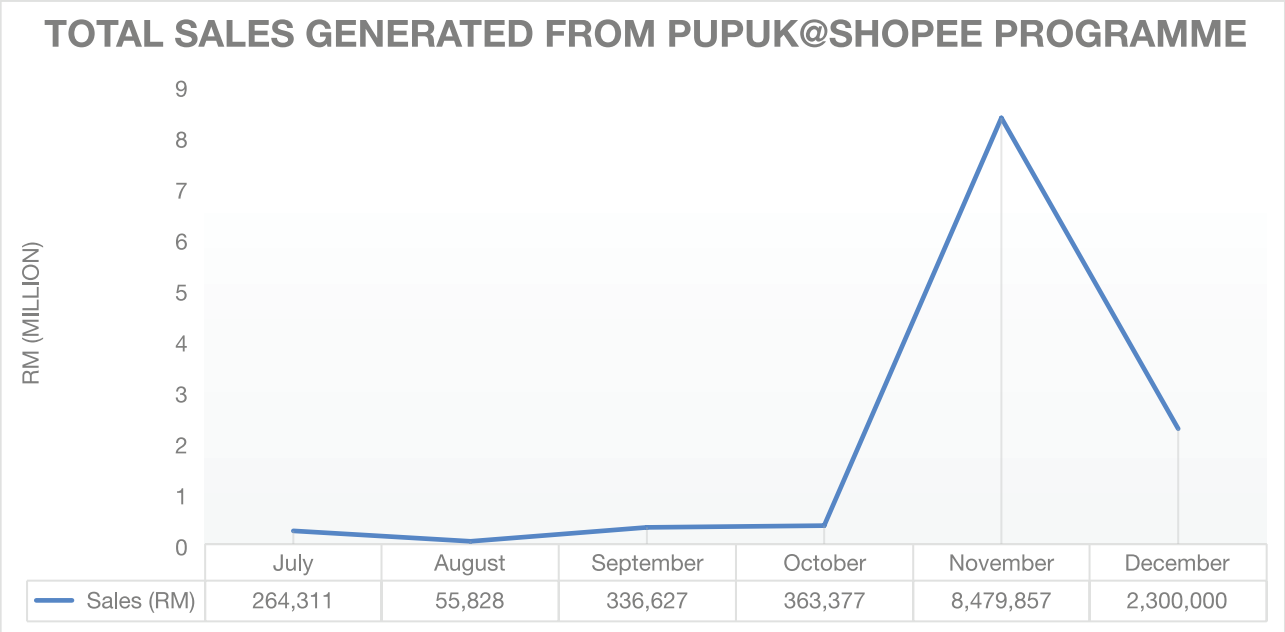

Figure 6: Sales Revenue of the Pupuk@Shopee initiative and achievements for the period from 29 June to 31 December 2021[5]

times Returns of Investment (ROI) within five months. This initiative has effectively empowered 10,893 rural entrepreneurs nationwide.

Further to this, PEDi also boosted the gig economy for the community surrounding PEDi. From May 2021 to 31 Jan 2022, a total of 5,378[6] new jobs have been created within the community with the help of PEDi.

SUCCESS STORIES AT PEDI

Having reached a milestone of 14 years, PEDi have had meaningful social and economic impact on rural communities. The efforts have been fruitful, as numerous individuals have become successful digital entrepreneurs by transforming their traditional approach to business to online and on-board the e-commerce platforms. The success stories of some of the rural entrepreneurs trained by PEDi have proven that digital adoption in business has indeed created great opportunities for them. It is hoped that the initiatives at PEDi can further enhance the competitiveness of the digital entrepreneurs in the rural areas and uplift the socio economic advancement of the local communities.

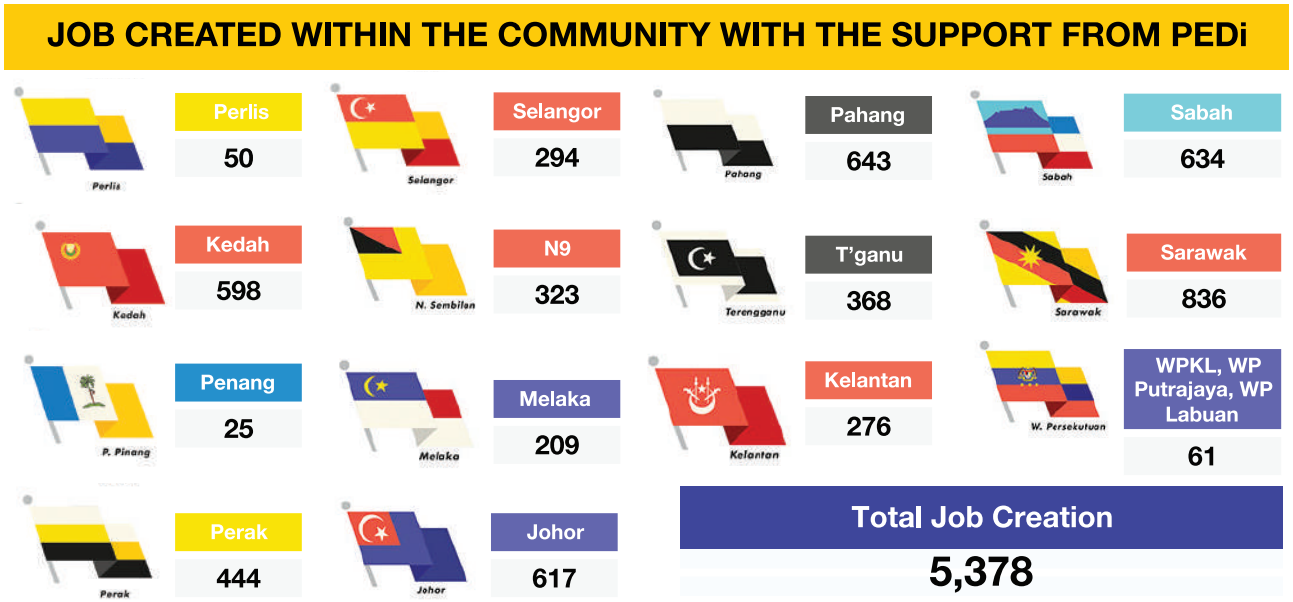

Figure 7: Total Job Created within the community with the support from PEDi (May 2021 until 31 Jan 2022)

[5] Source: Shopee Mobile Malaysia Sdn. Bhd.
[6] Source: Based on data gathering from DUSP that have been appointed to manage and administer the PEDi nationwide

SOME SUCCESS STORIES OF LOCAL ENTREPRENEURS WITH GUIDANCE FROM PEDi

Nor Ain Ahmad

- A travel agent who was affected by the Covid-19 pandemic in 2020
- She learnt entrepreneurial and startup skills with guidance from PEDi IOCC, Langkawi, Kedah
- Monthly sales increased from RM200 to more than RM12,000 after joining a proper e-commerce class conducted at PEDi IOCC, Langkawi, Kedah in July 2020
- Successfully opened a store on Shopee in August 2020
- As of February 2022, a total of 48 products available in her Shopee shop. She sells a variety of premium chocolates (some are repacked in small packaging), handmade crafts, and beauty and health products from Langkawi
- To shop, please visit https://shopee.com.my/langkawimall

Sahidah Fresh Kitchen

- A housewife who has been operating her business for 2 years
- Learnt how to sell on Shopee with guidance from PEDi Kampung Pianggu, Pahang
- She joined the Shopee marketplace in August 2021
- Generated more than RM40,000 in sales from the campaign as a result of the voucher incentives under Pupuk@Shopee programme
- To shop, please visit https://shopee.com.my/shop/291624603

Nor Amira Hasan

- A young entrepreneur who benefitted from the Pupuk@Aeon initiative
- Her marinated lamb product branded as Kambing Tough has been selected by AEON CO. (M) Berhad to participate at 10 AEON malls in Klang Valley and AEON online store
- Learnt to sell on e-commerce platform with guidance from PEDi Kampung Jambu Rias, Bentong, Pahang
- Monthly sales increased from RM1,000 to more than RM5,000 after joining an e-commerce platform
- To shop, please visit https://shopee.com.my/mirahasan96

NATIONAL DIGITAL IDENTITY

IMPROVING TRUST IN ONLINE TRANSACTIONS

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Digital Transformation (DX) is a new digital strategy, applicable across sectors inclusive of government services delivery and all business verticals, to enhance traditional business and services challenges and create digital innovations or opportunities through the adoption of new technology.

Digital Transformation has become the next "big" thing at every organisation in light of customer expectations and demands. It requires new adoption of digital technologies and a mindset of entirely new delivery value to the customer.

The digital economy presents tremendous new opportunities for Malaysia. The Malaysia Digital Economy Blueprint (MyDigital) and National Fourth Industrial Revolution (4IR) Policy provide clear directions towards transforming Malaysia in its digital transformation journey to become a digital nation with high income economy.

The blueprints aim to drive digital transformation in the public sector, boost economic competitiveness and create an inclusive digital society. It calls for the building of the enabling digital infrastructure and the creation of a secure and ethical digital environment.

In line with these government blueprints, the overarching national aspirations are that Malaysia will become a high-income digital nation through digital transformation across all sectors. DX will improve processes and productivity, deliver better end-user experiences, manage business risk, and control costs.

END-TO-END ONLINE SERVICES

The best level of online service delivery requires end-to-end solutions, whether for Government to Government (G-to-G), Government to Business (G-to-B), Government to Citizen (G-to-C), Government to Employee (G-to-E), Business to Business (B-to-B), and Business to Customer (B-to-C).

Figure 1: Government's Digital Transformation blueprints

It is important to understand what end-to-end online services mean. End-to-end services are those services that are fully carried out online from the start to finish. These services are accessible anytime and there is no need whatsoever for the user to deal face to face with the service provider.

Currently, most online government services are not fully end-to-end. Some merely provide e-counter services where clients are served at counters using ICT. Other services are partially end-to-end in that they are provided online but with some of the processes requiring physical interactions.

End-to-end online services have contactless, seamless, cashless and paperless characteristics. They will deliver a new experience to end users when they deal with government.

- Contactless is the feature where there is no requirement for over the counter services. All the services will be available online.

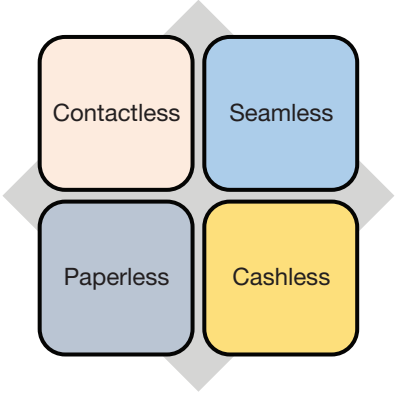

Figure 2: Features of end-to-end services

- Seamless service ensure that all the government services are integrated to each other. This will enhance the customer experience when dealing with government.
- Cashless transactions are where payments are made or accepted online without the use of hard cash.
- Paperless refers to no printed paper requirements. All forms and data are keyed in online. And for the signing of documents, digital signature would be used for paperless services.

80% of end-to-end online government services are targeted to be ready by 2025 under the MyDigital Initiative that will drive digital transformation in the public sector.

BENEFITS OF END-TO-END ONLINE SERVICES

End-to-end online services will provide a lot of benefits to the government, businesses and citizens. They will improve government services, making them easier, more efficient, transparent and productive. By their very nature, they will be available 24x7 to end users.

Since the services will be paperless, they will reduce the risk of loss, damage and destruction of documents. They will improve the accuracy, validity, security and integrity of online transactions. End-to-end online services will also make it easier for overseers and auditors to monitor services as there will be audit trails for all transactions.

There will be time and cost savings for both the government as well as the end users. These seamless services will improve the integration of government services, reducing the need for users to deal with different branches and offices. It should also reduce government

service disruption. Another important benefit, in the light of the pandemic, is the sharp reduction of health related risks that come from the removal of physical interactions.

The result would be the creation of a trusted digital ecosystem.

NATIONAL DIGITAL IDENTITY (NDI)

To ensure the trustworthiness of end-to-end services, security elements cannot be compromised. One of the most important components of the security element in these services will be the irrefutable verification of the user's identity. With the user's identity assured, the reliability of end-to-end transactions will be taken to new heights.

At this time, the digital identity landscape in Malaysia is fragmented. Each application or service will typically have its own solution. For instance, an e-hailing company will require you to undertake a KYC (Know your Customer) process that verifies your identity and an e-wallet company will have its own process. Users tend to end up with many identities and there is no uniform approach. Each solution will have its own security levels, resulting in some solutions at risk of security breaches.

To address this, the government has made the development of the National Digital Identity (NDI) system a major priority of the MyDigital initiative. The development of the National Digital Identity (NDI) project has been entrusted to the Ministry of Home Affairs (KDN). This initiative will take three years to be completed and is scheduled for completion by 2025.

NDI creates a trusted digital ecosystem that brings citizens, government and private services together. It is designed for everyone. Today, where almost everyone has a mobile device, it will be easy for online services with NDI to execute safe and secured transactions. It is important to be able to authenticate people via a unique digital ID. It will create a trusted digital ecosystem that provides a seamless experience when dealing with government services and carrying out online transactions within the digital economy ecosystem.

Its importance cannot be overstated. False identification is a major issue with regards to online crime. The NDI will provide a trusted unique digital identity to users for online services. This unique digital identification will prevent wrongdoing and ensure the trustworthiness of digital transactions.

The national digital identity must be irrefutable to serve its purpose as there must be no doubt as to the identity of the user. To achieve this, the NDI will use multiple biometric verifications such as fingers, facial biometrics and iris recognition. This will be done through E-KYC (Electronic Know your customer) with MFA (Multi-Factor

Figure 3: National NDI initiatives

Authentications) using biometrics, as mentioned above. Each ID will be unique and based on the Identity Card (I/C). To make clear, the NDI will not replace the National Identity Card. Nevertheless, because it is based on the IC, each citizen will only have one National Digital ID.

Other digital solutions will also be utilised. For instance, authentication for government and private digital services might be done through QR codes that integrate with NDI. QR code with NDI integration though a smartphone will be an easy and convenient way to verify a person's identity. QR Codes can give the management better visual security and control. Moreover, a QR code can streamline identification and authorisation of people in a contactless manner.

The NDI will assist in bringing innovations to services and applications. Passwordless authentication, which is a method to verify user's identity authentication without a password, will be possible with NDI. Passwordless methods use more secure ways such as biometrics (fingerprint, face, retina) and or possession factors like one-time password (OTP) and registered smartphone.

The NDI will not be limited to government services. It will affect all verticals such as business, financial institutions, telcos and utilities, digital marketplace, supply chain, education and training, travel and transport, and so on.

DIGITAL SIGNATURES

Another important element of digital identity applications, which is the digital signature will become trusted. It is much easier to sign documents digitally using digital signatures than the traditional physical 'wet signing'. The NDI will add trust into this process.

While there are digital signatures solutions in the market, it is important to differentiate that digital signature services that will be used for the NDI must be in compliance with Malaysian Laws and Regulations. Among the laws that are relevant are the Digital Signatures Act 1997 and the Electronic Government Activities Act 2007.

The Digital Signatures Act requires the identities of the signer or sender of the document to be irrefutably identified. The digital signature is valid if the recipient has trust that the sender was the party that signed the document or message and the sender cannot refute the signature and the message or document cannot be altered when it is in transit.

The Electronic Government Activities Act 2007 sets the legal requirements for electronic messages and signatures for dealings between the Government and private sector. This act stipulates that when any documents are signed digitally, the signatures must be logically linked to the message or document. The signer must be identifiable and verified as having consented to placing the signature. There must be full audit trails that can detect any changes to the signature or document after the signing.

NATIONAL DIGITAL IDENTITY IS A GLOBAL GOAL

Underlining the importance of trusted digital ecosystems, many countries have embarked on their national digital identity initiatives. Among the countries that have already implemented a digital ID system are Norway, Estonia, United Kingdom, Australia, Singapore, UAE and India.

Countries are implementing NDI because the benefits are immense. They bring trust into online transactions. They allow various means of verifying identities such as biometric and smartphone confirmation. The NDI will create seamless integration between different agencies, both government and commercial. It will be convenient for citizens when they carry out online transactions.

NDI is a fast and convenient way to prove who you are. It assists in overcoming fraud as each digital ID is unique to a user. It will deter identity theft. The status of the user will always be up to date. In brief, it will aid in creating a trusted digital ecosystem.

As a result, NDI will benefit government, businesses, service providers and citizen. When the digital ecosystem is trustworthy, it will become a catalyst for new digital innovations and accelerate the use of online services by the citizens, employees and businesses. On the other hand, it will also help overcome cyber crimes related to identity theft and fraud identity. MCMC was honoured to be given the mandate by the government to undertake a comprehensive study on user centric National Digital ID in 2019 and to recommend a workable model for the implementation of the National Digital ID. .my

OUT OF HOME SOLUTIONS

CONVENIENT ONLINE SHOPPING DELIVERY OPTIONS VIA RANGKAIAN PAKEJ

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The growth of the e-commerce market has increased the importance of Out of Home (OOH) solutions that satisfy the expectation of customers. The COVID-19 pandemic that restricted our movements accelerated the culture of online shopping, making it more popular and preferred by consumers. E-commerce has now become a popular choice for just about any kind of purchase. This has put pressure on the industry players, i.e. courier and third-party logistics (3PL) that provide parcel delivery services to solve last-mile delivery issues with solutions that not only satisfy the customers but also other stakeholders such as local authorities and other related agencies.

The last-mile delivery as the final step of order fulfilment is a critical point in the supply chain and e-commerce activity. It is currently facing issues due to the tremendous growth of parcel volumes. OOH solutions, commonly known as pick-up-drop-off (PUDO) services, help address the issues through the availability of parcel collection points in the form of a parcel locker or retail service counter. They help to ensure that customer expectations and experience remain intact. Otherwise, when customers are not reachable to receive parcels even after relevant notifications are given, failed and missed deliveries are triggered. These can impact the industry's efficiency and increase logistics costs. Hence, pick-up-drop-off service is a potential solution towards solving these last-mile delivery challenges.

THE GROWTH OF E-COMMERCE IN MALAYSIA AND WORLDWIDE

The Department of Statistics, Malaysia (DOSM), in a press release titled *'Income of E-Commerce Transactions Surged 30.0 per cent in The First Quarter 2021'*, reported that e-commerce income in Malaysia is increasing exponentially. DOSM said that in 2020, income for e-commerce recorded RM896.4 billion, an increase of 32.7 per cent as compared to 2019. Every quarter recorded increased figures. The first quarter of 2020 recorded RM195.9 billion and RM216.9 billion in the second

Figure 1: Pick-Up-Drop-Off (PUDO) Points Through Parcel Locker Facility

quarter. Meanwhile, for the third and fourth quarters of 2020, income for e-commerce registered RM238.2 billion and RM245.4 billion, respectively. In the first quarter of 2021, income for e-commerce recorded RM254.6 billion, with an increase of 30.0 per cent year-on-year.

From the perspective of adoption, DOSM found that the usage of ICT & E-commerce during Movement Control Phases (MCO) increased sharply from 38.1 per cent of establishments during MCO to 92.4 per cent in the Restricted Movement Control Phases (RMCO).

From another perspective, the Edgemarket, a leading Malaysian financial publication, published an interesting outcome of a retail survey issued by Facebook and Bain & Co. It revealed that 22 million consumers in Malaysia are digital consumers, with online channels playing four times larger roles than offline channels. This makes Malaysia appear to be the region's king of e-shopping. The same survey also indicated that consumers spent 80% of their time online making a purchase decision. Other findings revealed that 88% of the total Malaysian population are digital consumers, ahead of Indonesia at 80% and Singapore at 79%, with nine out of 10 Malaysians undertaking online shopping. The same source also shared that 46% of Malaysians have already adopted online purchases as their primary purchasing channel,

Figure 2: Pick-Up-Drop-Off (PUDO) Points Through Retails Service Counter

contributing to online sales that account for 57% of total retail sales in Malaysia. This remarkable development has put Malaysia as a leader in adopting e-payment and increased the importance of e-commerce players.

Another confirmation of the surge in e-commerce due to the COVID-19 pandemic is seen in a report published by

Figure 4: Amongst Iconic E-commerce Platform Brands in Malaysia

United Nations in 2021. The 'Covid-19 and E-Commerce: A Global Review' reported that the COVID-19 pandemic accelerated digital transformations as economic and social activities needed to continue remotely. Interesting findings were captured from various countries on the growth of e-commerce sales, as illustrated in Figure 5.

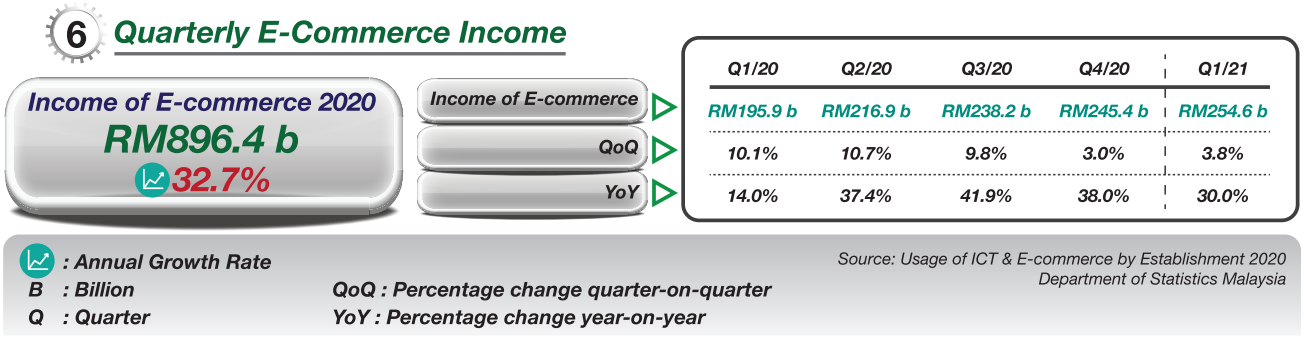

Figure 3: The Growth of E-commerce Quarterly Income 2020/Q1-2021

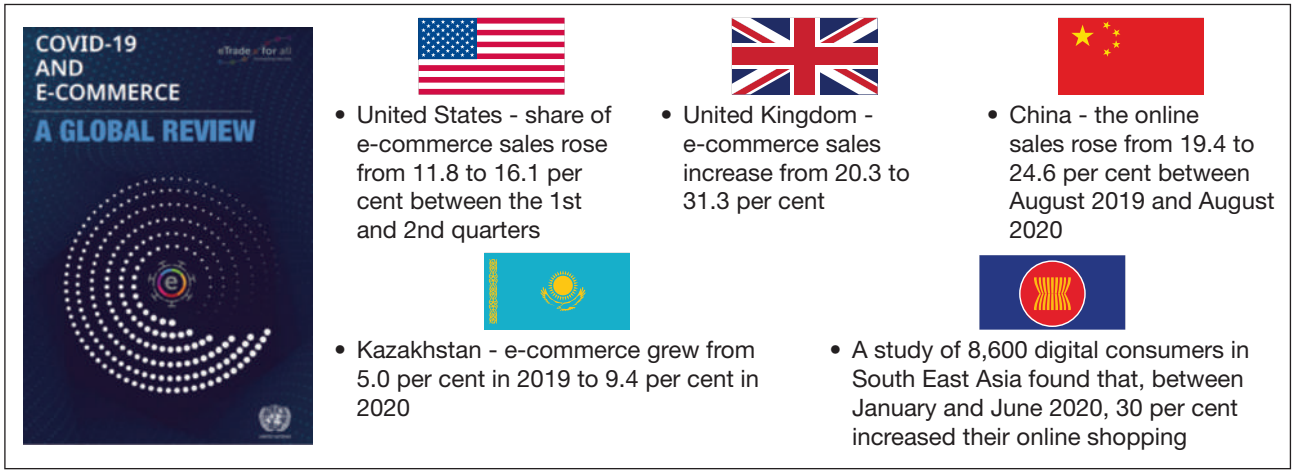

Figure 5: The Growth of Global E-commerce During Covid-19 Pandemic

These facts and figures confirm that e-commerce sales keep climbing every year with consumers from every part of the world purchasing goods or services online more than ever before.

E-COMMERCE NURTURES A CASHLESS PAYMENT LIFESTYLE

In Malaysia, the rise of e-commerce has brought about a boom in cashless payments, making it the key driver of the digital transformation taking place in our economy and society. Janio – amongst the main logistic players in Southeast Asia - reported interesting observations through an article entitled *'Malaysia's Online Shoppers and Their Online Shopping Behaviour'*. It found that mobile banking is the most popular method of paying for online purchases with 68.4% consumers having already adopted it. On the other hand, 11% of consumers, mainly 45 to 54-year-old Malaysian shoppers, prefer cash on delivery (COD) when shopping online as they are afraid of credit card scams and payment data leakage. Nevertheless, this does not stop them from continuously purchasing through various e-commerce platforms.

Figure 6: E-commerce Payment Behaviour in Malaysia

EMPOWERING E-COMMERCE THROUGH OUT-OF-HOME SOLUTION INNOVATION

The advancement of technology and shared resources in the last-mile delivery ecosystem, together with mobile and sensor capabilities, have brought to the fore the pick-up-drop-off (PUDO) service out-of-home solution. This innovation strengthens the parcel delivery ecosystem by reducing commercial vehicle dwell time and cutting the number of failed first delivery attempts.

The deliveries' function in e-commerce in the business-to-consumer (B2C) market today focuses more on home deliveries. However, this situation could impact the quality of service amid traffic congestion problems, especially in the city environment. Therefore, it is crucial to look for alternative measures which will help reduce this negative impact on efficiency in the last mile delivery system.

To ensure that the Malaysia courier industry can hold its ground in expanding e-commerce growth without compromising the quality of service for people and businesses, the Malaysian Communications and Multimedia Commission (MCMC) has implemented various strategies to meet the needs in Malaysia. Amongst the strategies being put in place are expanding more pick-up-drop-off services nationwide in collaboration with the industry players.

THE DEFINITION

Out Of Home or more known as 'OOH' solution, can be defined as a parcel pick-up-drop-off in the form of a location, often a local shop or retail outlet, that offers a parcel pick-up-drop-off service as part of a wider and trusted network of pick-up-drop-off service location points. This service allows parcels to be picked up or dropped off at locations where a trusted network member receives them. Basically, through pick-up and drop-off, there is no need for a consumer or customer to wait for a delivery to arrive or pick-up. The pick-up-drop-off location will be available to receive any expected deliveries and

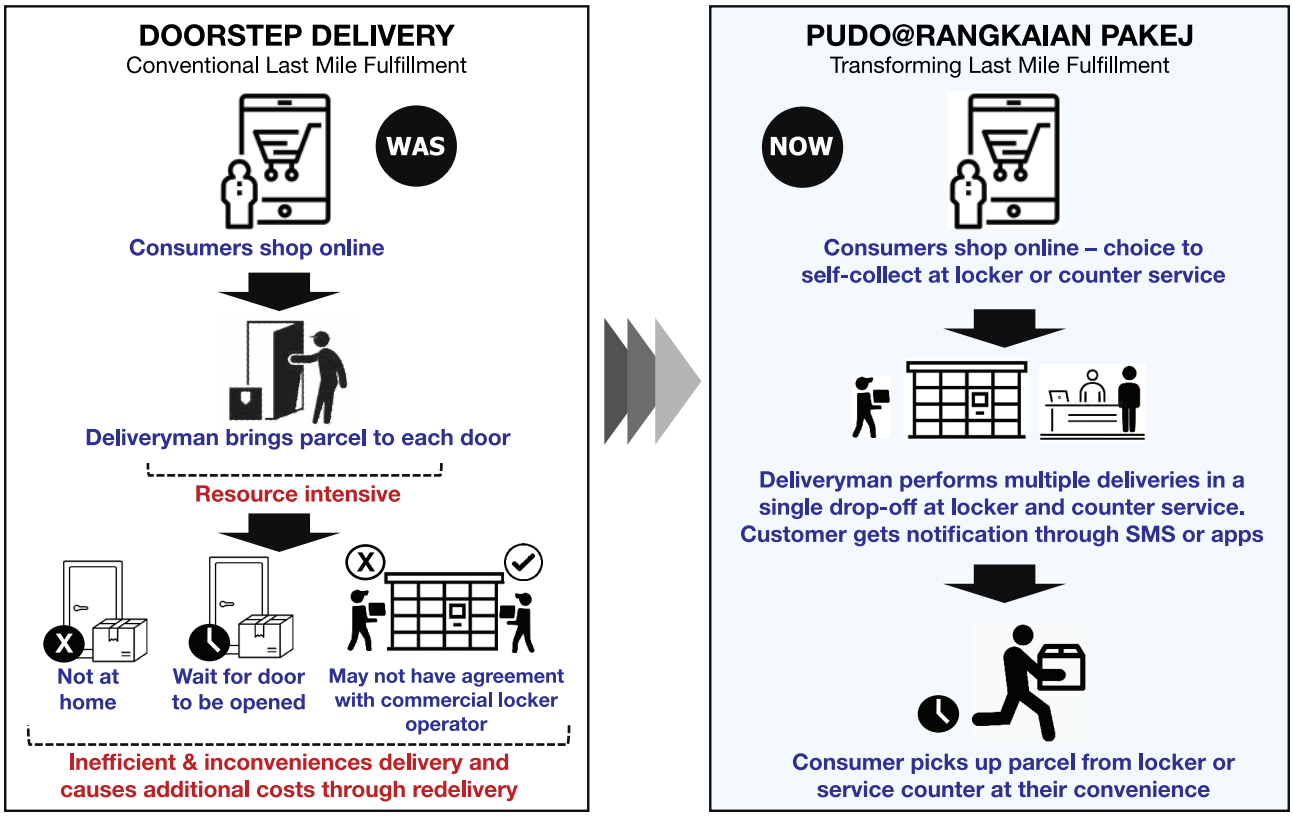

Figure 7: Reflection of Consumer Journey Experience Before and After the Rangkaian PAKEJ (pick-up and drop-off service) Deployment

any drop off items as well as await collection of the item by the designated courier.

Figure 7 depicts the consumer journey experience - before and after the pick-up and drop-off service is made available.

The pick-up and drop-off service connects stakeholders in new and efficient ways and enables the transformation of last-mile fulfilment where consumers and service providers will benefit through the advancement of processes and technology.

THE CASE FOR OUT-OF-HOME SOLUTIONS IN MALAYSIA

Malaysia aims to grow the postal and courier industry by providing first-class Quality of Service for the users through the achievement of four (4) target objectives known as 4R, namely Reliability, Reach, Relevance and Resilient. Hence, why the 'National Courier Accelerator Plan' blueprint which is also known as 'PAKEJ' (or Pelan Accelerator Kurier Negara) was developed by MCMC with support from 108 participants from 35 agencies. It leveraged on the 4Rs to contribute to the aspiration of the national courier industry as following:

i) First-class Quality of Service for the users;
ii) Improved integration of last-mile delivery; and
iii) Seamless customer experience, delivery integration, and coverage via 'contactless' within the new norm that supports the national economic plan.

To achieve the target, among the strategies being put in place is the introduction of the Rangkaian PAKEJ Initiative that provides pick-up-drop-off services nationwide in collaboration with the industry players. It includes leveraging on the existence of Pusat Ekonomi Digital Keluarga Malaysia (PEDi) as a pick-up-drop-off location by the local entrepreneurs. The Rangkaian PAKEJ

Figure 8: The 4Rs – Target Objectives for First-Class Quality of Service

has been identified as amongst the strategic approaches under the PAKEJ blueprint to support the 'Achieving Industry Sustainability' pillar. This pillar aims to enhance the e-commerce industry growth from 14 to 30 parcels per capita by 2025.

RANGKAIAN PAKEJ PROBLEM STATEMENTS

The problem statements that drive Rangkaian PAKEJ into the scene are triggered by multiple challenges faced by the industry players and the consumers, as listed below:

i. **Missed deliveries** - a recent survey by MCMC on the parcel delivery performance showed that missed deliveries on first and second attempts stood at an average of 10% and 67%, respectively. The issues caused by the absence of the recipients at home have put an additional cost on the industry players as they have to bear the unnecessary expenses of managing the undelivered parcels during the first and second attempts of delivery. These challenges could be solved by offering the comfortability to receive parcels anytime, anywhere according to the consumer's convenience.

ii. **High volumes** - industry players do not have sufficient strength to cater for on time parcel deliveries due to a lack of workforce and facilities.

iii. **Parking issues** - there are multiple challenges associated with commercial vehicle parking, especially in the residential areas and high-rise buildings such as apartments and condominiums where the parking space is minimal. This causes issues and stress for package delivery persons to deliver the package on time. Furthermore, the courier company have to provide extra staff to support the delivery person to fulfil the delivery task.

iv. **COVID19 pandemic** - contactless delivery is preferable by some consumers to avoid the high risk of infection.

PURPOSE OF RANGKAIAN PAKEJ

The purpose of Rangkaian PAKEJ, as per Figure 9, can be divided into three (3) significant purposes, namely:

i. To instil collaboration between e-commerce players, marketplaces, couriers, parcel locker providers and MCMC through discussions, work visits, cooperation, and strategic activities.

ii. Interoperable platform available for use by all courier players for development purposes and accessibility by the public; and

iii. To improve synergy among pick-up-drop-off providers, courier services, and MCMC to elevate pick-up-drop-off usage through possible shared services and resources.

In connection to this, the role of retail pick-up-drop-off points, courier providers, and parcel locker providers are essential to attract higher utilisation of Rangkaian PAKEJ by the public. However, they must be aware of the community needs as different geographical locations,

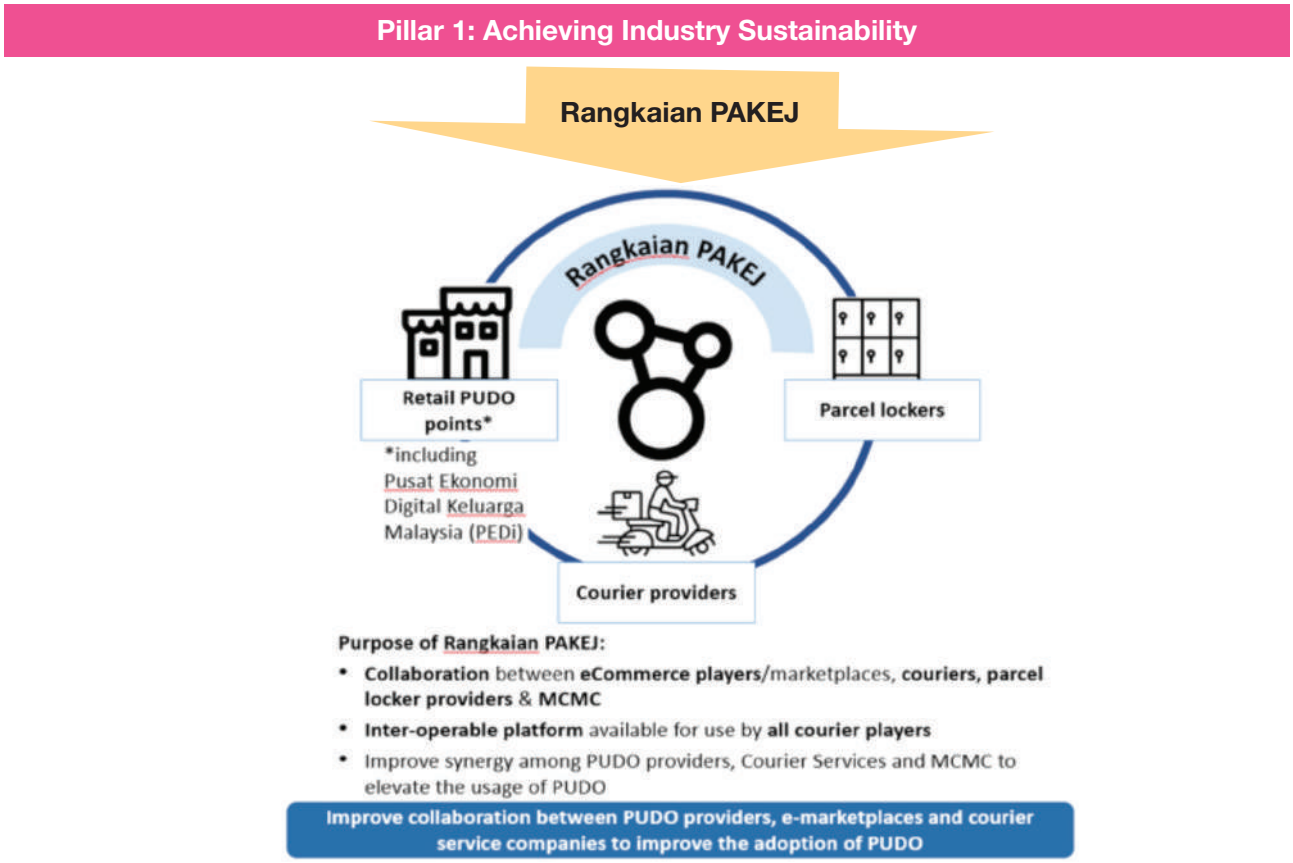

Figure 9: Strategy for E-commerce Growth Through Rangkaian PAKEJ

backgrounds and cultures of communities may require different strategies.

POTENTIAL LOCATIONS FOR RANGKAIAN PAKEJ SERVICES DEPLOYMENT

Identifying suitable facilities for introducing pick-up and drop-off services are important as they need to be significant and beneficial for the residents in the area. There are various potential locations for the setting up of pick-up-drop-off services. A write-up entitled *'Optimal Location Analysis of Delivery Parcel-Pickup Points Using AHP and Network Huff Model: A Case Study of Shiweitang Sub-District in Guangzhou City, China'* said that pick-up-drop-off services locations in France mainly depend on small local facilities, such as press kiosks, bars, florists, and tobacco shops. In the UK, pick-up-drop-off facilities have been established in frequently visited public facilities in urban areas, such as post offices, petrol stations, and small shops. In Guangzhou, the service providers collaborate with retail shops (e.g., supermarkets, convenience stores) and service shops (e.g., car maintenance shops, real estate shops). It was also found that the factors that contribute to the decision depend on the population density, accessibility to residents, and the residents' preferences.

As for the case of Rangkaian PAKEJ, the following target locations are expected to generate higher pick-up-drop-off services transactions as well as convenience to the residents living in the areas surrounding the facilities.

Amongst the considered identified locations that have been targeted for Rangkaian PAKEJ services deployment based on their convenience of services are as follows in Figure 10.

THE BENEFITS OF OUT-OF-HOME SOLUTIONS

Essentially, Rangkaian PAKEJ will ensure sustainability of services in the long run. The development of Rangkaian PAKEJ is expected to create various out-of-home benefits to six (6) Malaysian stakeholders – Individuals, Businesses, Postal/Carriers, Government Agencies, Service Providers Players and Regulators, as shown in Figure 11.

Overall, Rangkaian PAKEJ increase the demand for pick-up and drop-off services by fostering effectiveness and competitiveness reflected in the following situations:

i) Digital service that is more efficient and trusted to address the issue of late and missed parcel delivery caused by the absence of parcel recipients at home;
ii) A solution for individuals without home addresses. It acts as a 'second home address' to enable the parcel to be received at any time and anywhere in a safe manner by the recipients;
iii) Ease collection and sending of parcels during the journey to work or from home;
iv) Increase the visibility of services by the industry players, as well as promote their services for access by the potential customers;
v) Enhance safety and consumer privacy;
vi) Promote digital lifestyle – cashless payment, paperless technology and QR code adoption; and

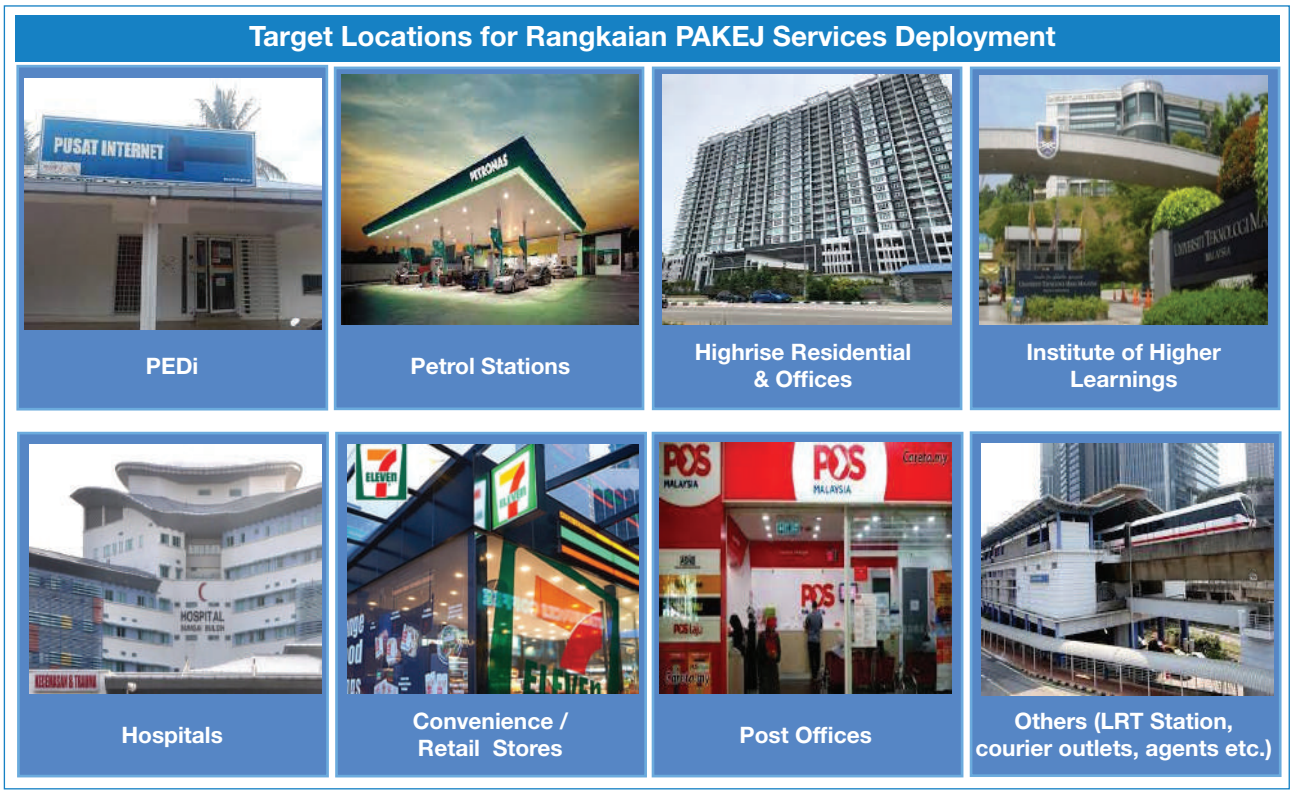

Figure 10: Target Locations for Rangkaian PAKEJ Services deployment

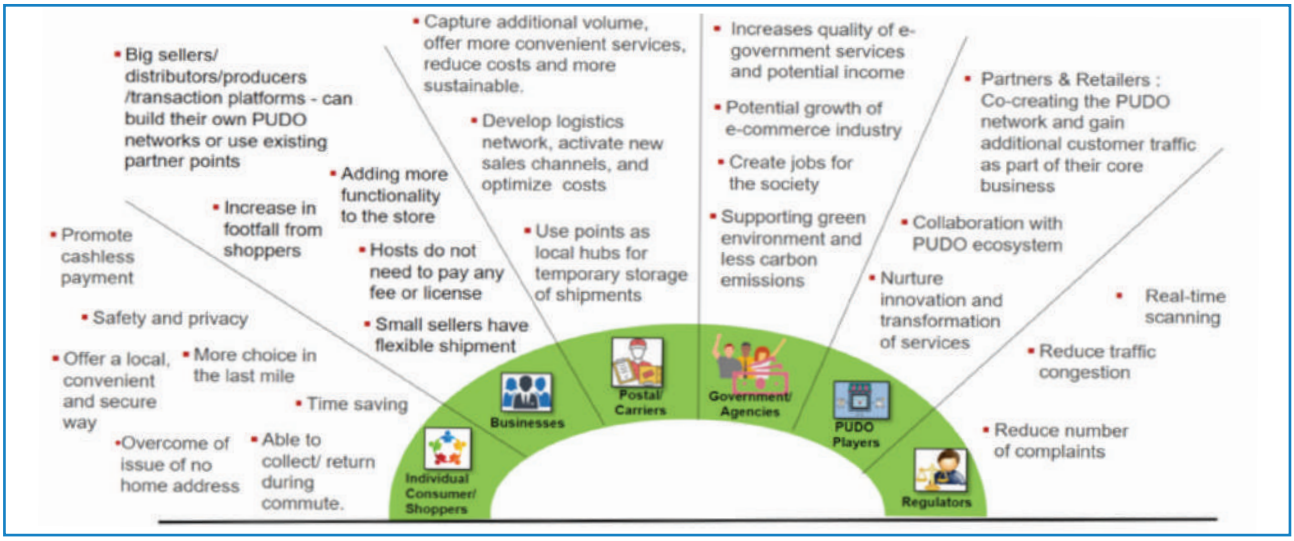

Figure 11: Various Out-Of-Home Benefits to the Various Stakeholders

vii) Promote green technology by reducing carbon emissions.

THE IMPACT OF PAKEJ ON THE NATIONAL PROGRAMME AGENDA

The impact of courier industry development and transformation through PAKEJ can contribute to the achievement of National Digital Aspirations through Malaysia Digital Economy Blueprint (MyDIGITAL). MyDIGITAL looks at the importance of digitalisation across sectors as highlighted in the Thrust 2 - Boost Economic Competitiveness Through Digitalisation. Similarly, PAKEJ will support the achievement of the National Economic Strategic Roadmap 2.0, which aims to get 875,000 micro, small and medium enterprises (MSMEs) to adopt e-commerce in the Business sector. The presence of PAKEJ will ensure the smoothness of delivery service operation. At large, it will help the government achieve a 30% increase in productivity of the economic sector by 2030. From the perspective of the reduction of carbon mission target, Malaysia has set an ambitious commitment to reduce the intensity of its carbon emissions by 45% by 2030 compared to 31% in 2020.

The impact of the out-of-home solutions on the society of Malaysia is huge. They deliver important benefits such as enhanced rural economic growth, services and social opportunities, transformation and establishment of micro, small-medium industries (MSMEs), the creation of jobs and the digitalisation of businesses through the adoption of QR codes, mobile platforms, cashless payment, sensor technology etc.

As for the community's well-being, the impact of out-of-home on society could be seen through the improvement of a community's quality of life through ICT applications. Another crucial impact of building out-of-home solutions is that it encourages innovation and creativity that create real economic opportunities.

The Pusat Ekonomi Digital Keluarga Malaysia (PEDi) in various locations in Malaysia has many use cases and success stories by the local entrepreneurs who leverage the benefits of home solutions to deliver their products more efficiently, much faster and with higher sales profits after using the Rangkaian PAKEJ (pick-up and drop-off) service.

With its existing features and functions, it is hoped that Malaysian consumers will reap the benefits of Rangkaian PAKEJ. It will generate added values to create socio-economic impact to our society at large and at the same time empower the growth of Malaysian digital economy and put Malaysia on the global e-commerce map. .my

With the assistance and guidance given by PEDi Chenor, Pahang, Pn. Salmiah Fudzil, a local entrepreneur in Chenor has been able to sell products online and undertake parcel delivery via PUDO service at PEDi Chenor to distribute her food products throughout the country. The staff at PEDi have also provided support in the parcel packaging process which contributed to efficient and faster parcel delivery.

Pn. Salmiah and PEDi staff undertaking the parcel processing at PEDi Chenor

THE NATIONAL PUBLIC KEY INFRASTRUCTURE (PKI)

AN ESSENTIAL COMPONENT IN THE PROVISION OF DIGITALLY SIGNED ELECTRONIC PRESCRIPTION SERVICE

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The advent of the internet and the digital age provides massive opportunities to use computer-aided medical support such as telemedicine and e-prescription. The use of telemedicine and e-prescription increases the interaction and the sharing of data amongst doctors, hospitals, patients and last but not least, pharmacists. With the increased sharing and electronically available health data, there is an increased risk of malicious attacks such as hackers gaining access to confidential information. Putting electronic personal health information onto the internet drastically exposes this information to more severe hostile attacks as compared to paper-based medical records.

Electronic prescription, or in short "e-rx", defined as the process of electronically generating and sending a prescription order, allows doctors to send prescriptions to a pharmacy from any point of care. A prescription is an essential legal document. The management of prescriptions is regulated by law to ensure that drugs are dispensed against a specific prescription. Both prescriber and dispenser will have to ensure there are no duplications of any prescriptions, as they may severely affect patient safety. By using e-prescription, a prescribing doctor can effortlessly select the type of medications needed to be given to a patient. The doctor can easily generate an e-rx with just a few clicks when handling repeat supplies, significantly reducing prescription errors. In addition, dispensing error is reduced considerably at the pharmacist level as illegible hand-written prescriptions are no longer relevant.

E-prescription is the same as a customarily written prescription but is generated and transmitted electronically using a digital medium between a prescribing doctor to a pharmacy dispensing the medication. As a result, e-prescription allows for accurate and legible prescriptions, which minimises the possibility of wrongly dispensed medication due to the misinterpretation of prescriptions and eliminates the problem of patients losing their prescriptions.

WHAT IS PUBLIC KEY INFRASTRUCTURE (PKI)?

Public Key Infrastructure or PKI is defined as the set of hardware, software, people, policies and procedures needed to create, manage, store, distribute and revoke public keys digital certificates. An authorised Certification Authority (CA) issues the digital certificates, which act as a trusted third party. These digital certificates are issued with private and public key pairs linked to a user (server, computer, or device) upon verification of the identity of the digital certificate applicant.

The primary role of PKI is to provide a mechanism for the public keys to be made publicly accessible. PKI enables users to perform electronic transactions in a safe environment as well as identify any individual who carries out the transactions.

The PKI performs encryption through the public and private key pair of a digital certificate created based on strong cryptographic technology that is secured and cannot be counterfeited. Once a digital certificate is issued to an applicant, the applicant's identity to whom the certificate is issued will have been verified, and other users can trust the legitimacy of the key holder's identity. Thus, PKI enables identity authentication, data encryption and digital signing.

THE USE OF PKI AND DIGITAL CERTIFICATES IN E-PRESCRIPTION

In the issuance of the e-prescription process, a CA combines the public key with the information used to uniquely identify the private key (such as the serial number of the e-prescription) and then signs the resulting certificate file (as illustrated in *Figure 1: The Signing Process*). When this process is completed, the private key and certificate are imported to each e-prescription.

Once the private key is contained in the e-prescription, it cannot be tampered with. The private key and certificate are unique for each doctor issuing the e-prescription. This use of private and public keys will prove the authenticity and integrity of the e-prescription and will be able to prevent counterfeit or tampered e-prescriptions.

Privacy is ensured with the use of a public key cryptography algorithm to encrypt the prescriptions, and digital signatures are used to bind a public key to a user's identity, which in this case is the doctor who issued and digitally signed the e-prescription. The pharmacist receiving the e-prescription decrypts and retrieves the prescription using the decrypting algorithm and verifies where the prescriptions came from using the digital signature.

Using PKI and digital signature in e-prescription saves the handling cost of bringing the physical prescription to a pharmacy. It also reduces processing time as the prescription can be sent electronically and improves security as it is based on a secure mechanism. In addition, any tampering can be detected (the integrity of prescription) and results in more substantial identity assurance (authentication) to prevent errors, reducing security risks.

E-PRESCRIPTION USING DIGITAL SIGNATURE IN MALAYSIA

E-prescription utilising Digital Signature has only recently caught on in Malaysia. Doc2Us was the first healthcare provider in Malaysia to issue e-prescriptions utilising Digital Signature, starting in January 2020. The

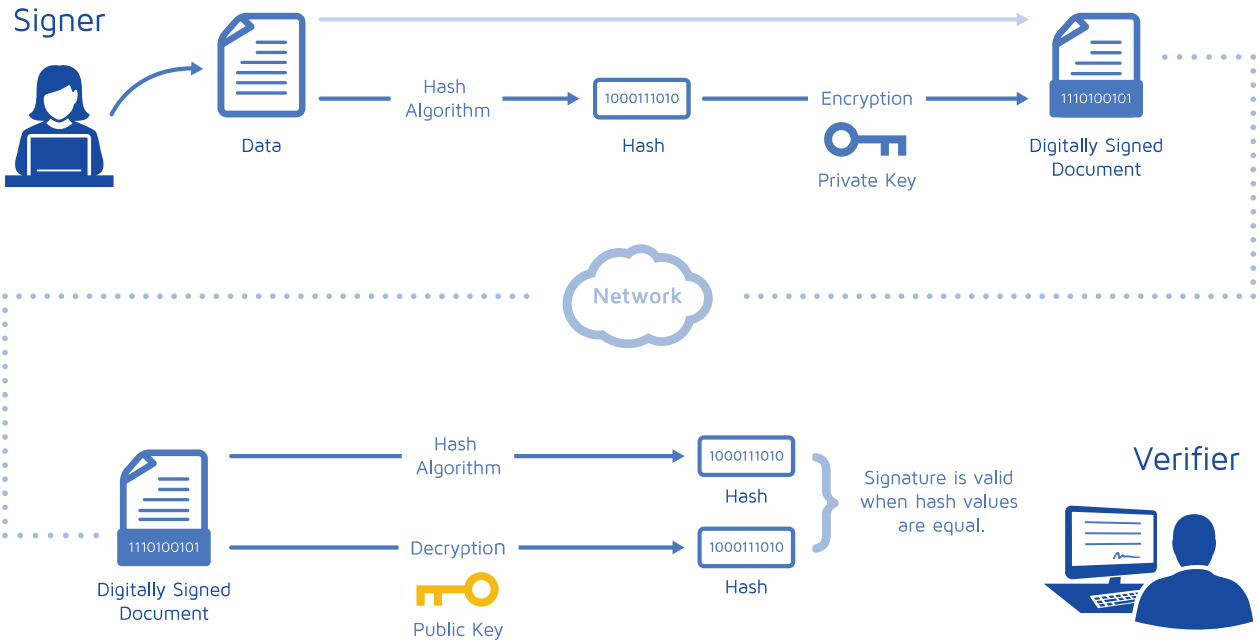


Figure 1: The Signing Process (Source: https://www.docusign.com/how-it-works/electronic-signature/digital-signature)

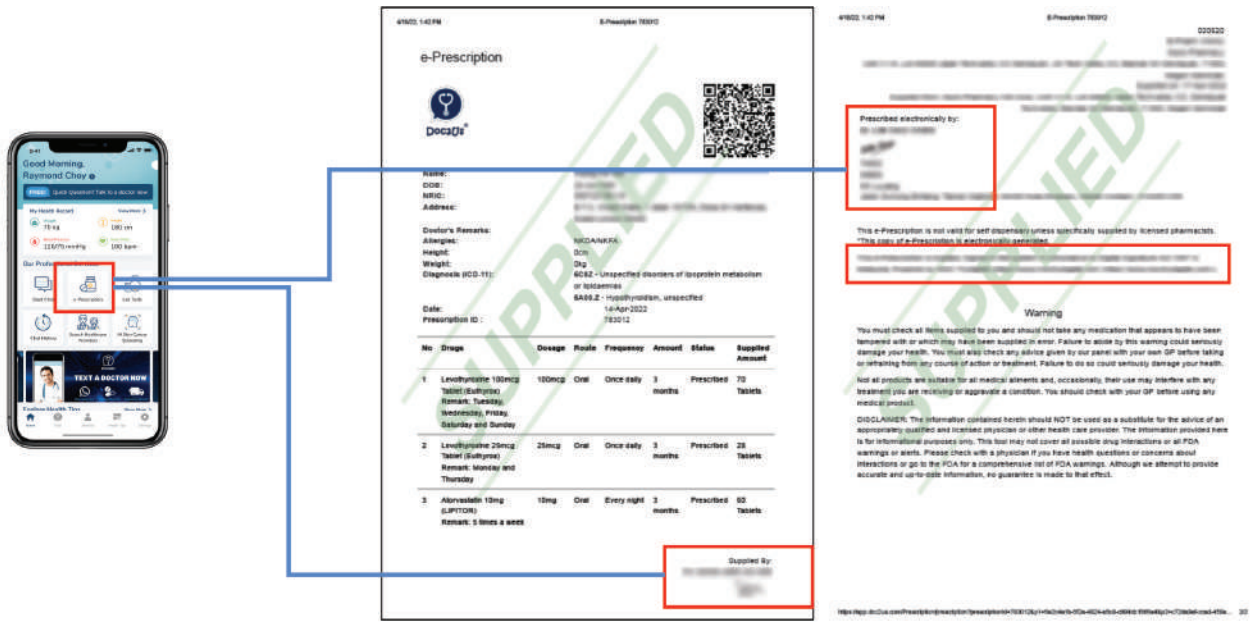


Figure 2: Samples of Digitally Signed E-Prescription (Source: https://www.doc2us.com)

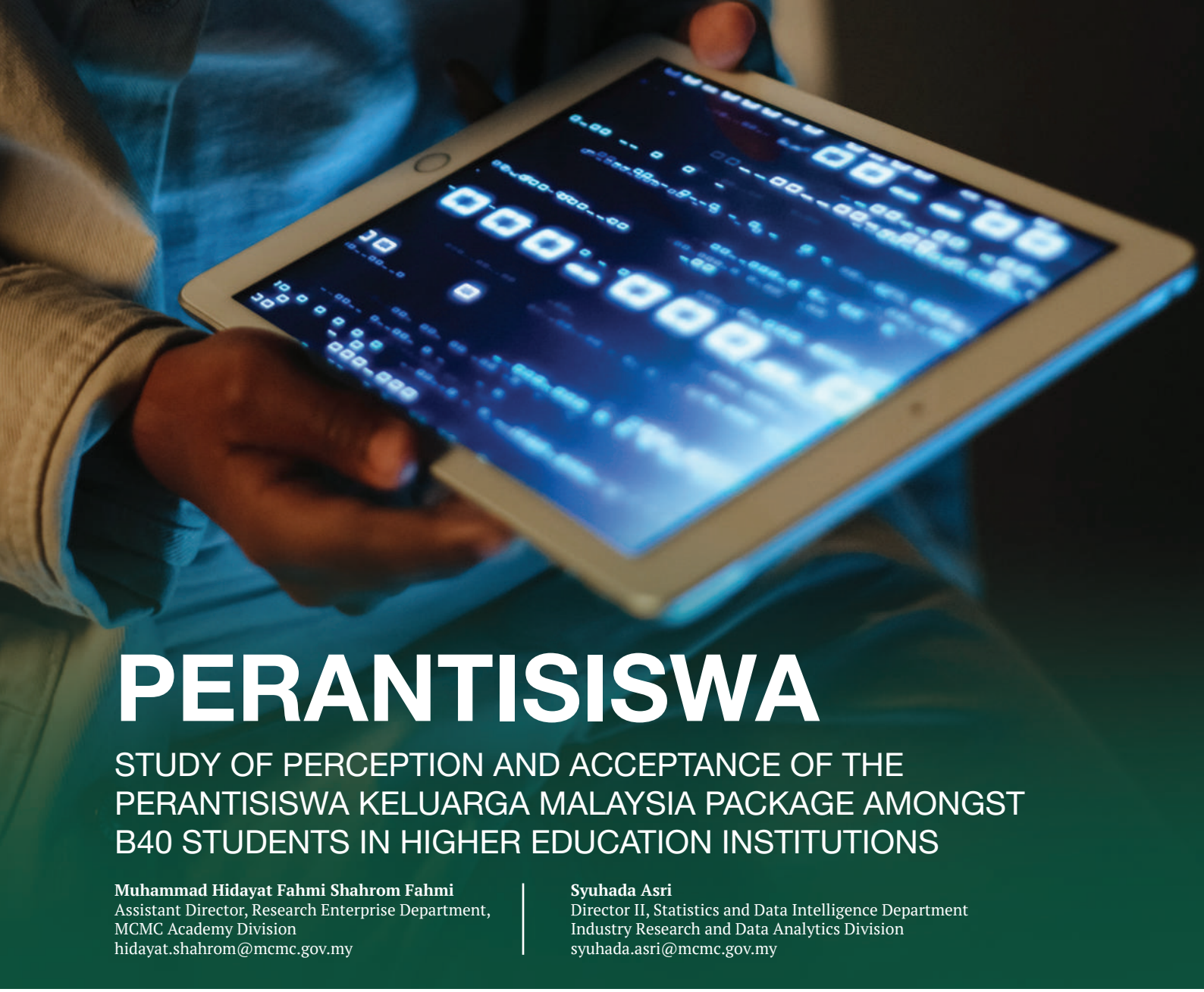
surge in issuance of digitally signed e-prescriptions was partly attributed to the Movement Control Order during the Covid19 pandemic. Between June 2020 and May 2021, Doc2Us issued 216,458 Digital Signature e-prescriptions, and the Malaysian Book of Records verified this. Other than Doc2Us, DoctorAnywhere and Doc2Door also utilise Digitally Signed E-Prescription.

The Digital Signature Act 1997 (DSA 1997), which came into force on 1st October 1998, regulates the use of digital signatures in Malaysia. It ensures the security of legal issues related to electronic transactions and verifies the usage of digital signatures through certificates issued by licensed Certification Authority (CA).

The Malaysian Communications and Multimedia Commission (MCMC) is responsible for administering, enforcing, carrying out, and giving effect to the provisions under DSA 1997 for monitoring and overseeing the activities of CAs. To date, MCMC has issued licenses to four (4) companies to be recognised as licensed Certification Authority and is responsible to monitor and oversee their activities.

SUMMARY

The Public Key Infrastructure (PKI) can act as the building block of a secure digital health ecosystem. PKI can mitigate the security risks associated with large-scale digital health service deployment. The ecosystems that rely on PKI can apply encryption, provide authentication, and signing services. Additionally, a PKI-based ecosystem ensures strong identity and message integrity for data exchange between relevant users such as doctors, patients and pharmacists, systems, devices and applications. This will result in increased confidence in users adapting to and continue using e-prescription and PKI as a whole. .my



PERANTISISWA

STUDY OF PERCEPTION AND ACCEPTANCE OF THE PERANTISISWA KELUARGA MALAYSIA PACKAGE AMONGST B40 STUDENTS IN HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

As the world transitions to a digital age, a student's learning process becomes heavily dependent on digital devices and networks. However, for students from the B40 family, it can be quite a challenge to obtain reliable digital devices and network capacity to support the learning process. This is more apparent for tertiary students whose curriculum requires most, if not all, to source for learning materials online and to submit assignments in the form of digital documents such as Microsoft Word or PDF. This study evaluated the perception and acceptance of students towards the PerantiSiswa Keluarga Malaysia Package, an initiative intended to resolve the abovementioned issues by providing Higher Education Institution (HEI) B40 students with a tablet. Through the quantitative survey conducted with 384 B40 students from eight (8) HEIs in Kuala Lumpur and Selangor, it was found that the majority of the students responded positively to the PerantiSiswa Keluarga Malaysia Package. However, most of them had never heard of the package.

Keywords: B40 students, Higher Education Institution, perception, acceptance, PerantiSiswa Keluarga Malaysia Package.

INTRODUCTION

The PerantiSiswa Keluarga Malaysia was announced during the 2022 Budget speech in October 2021, with RM450 million budget allocation from government funding. It is a government initiative, spearheaded by the Ministry of Communications and Multimedia (currently known as Ministry of Communications and Digital) in collaboration with the Ministry of Finance and the Ministry of Higher Education, which intended to help the learning process of HEI students, especially those in the B40 group, through distribution of tablets. This initiative also reflects the government's concern in meeting the needs of online learning, especially for B40 students to form a digital community and bridge the digital gap between groups. Initially, the tablets are to be provided on loan basis however, during the launch of PerantiSiswa Keluarga Malaysia in September 2022 by the YAB Prime Minister, it

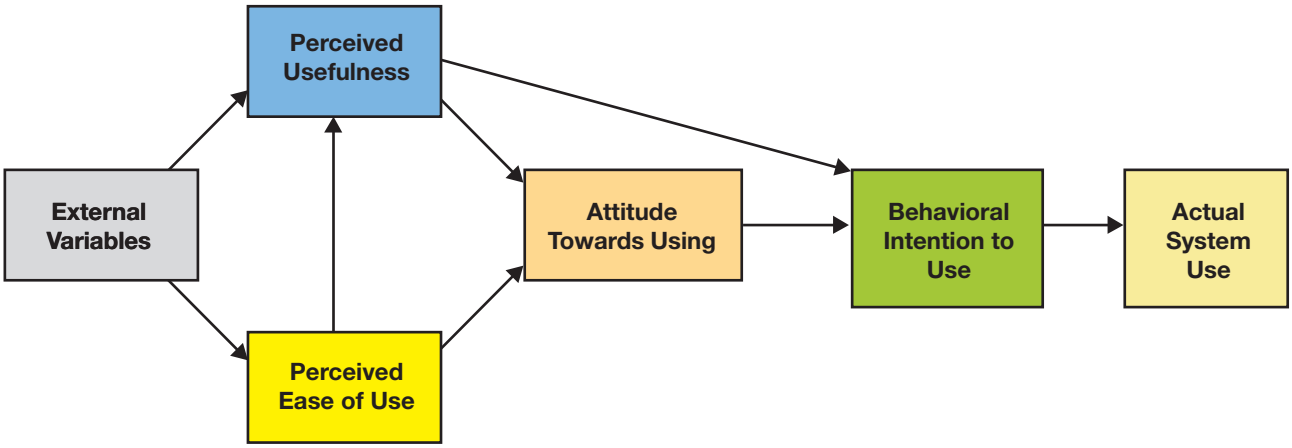

Figure 1: Davis's Technology Acceptance Model (1989)

was announced that the tablets will be distributed outright to the students, considering the feedback received by the Ministry of Communications and Multimedia and student representatives. Prior to the launch of the initiative, the Malaysian Communications and Multimedia Commission (MCMC) has conducted a 'dipstick' study in January and February 2022 to understand the perception and acceptance of the PerantiSiswa Keluarga Malaysia amongst HEI students from the B40 family in Malaysia. The overall aim of the study is to gauge the responses of the B40 students towards the PerantiSiswa Keluarga Malaysia to determine its relevance. The study is specifically guided by these research objectives:

a) To assess the perception of B40 students in HEIs on the PerantiSiswa Keluarga Malaysia;
b) To assess the level of acceptance of B40 students in HEIs to the PerantiSiswa Keluarga Malaysia; and
c) To verify the suitability of the proposed tablet under the PerantiSiswa Keluarga Malaysia for usage amongst B40 students in HEIs.

METHODOLOGY

Davis's Technology Acceptance Model (TAM) (Figure 1) was selected as the theoretical framework for the study to fulfil all three objectives of the study. As a model, TAM measures a user's acceptance of a technology through their perceived usefulness and perceived ease of use. Using this model, the study will be able to collect data on the respondents' perception and level of acceptance of the device provided under the PerantiSiswa Keluarga Malaysia Package.

This study reached a sample of 384[1] respondents from the target population (HEI students from B40 family) at the national level. There was only one stage of sample selection as the survey adopted a stratified random sample technique, of which the sample stratification is proportionate to the type of HEIs i.e., public and private universities. Eight (8) HEIs comprising of three (3) public universities and five (5) private universities namely Universiti Teknologi MARA (UiTM) Shah Alam, UiTM Puncak Alam, UiTM Puncak Perdana, German Malaysian Institute, Kolej Polytech MARA, Newton College, Kolej Universiti Antarabangsa PICOMS and UNITAR International University were selected to participate in the study.

Image 1: Fieldwork session at UiTM Puncak Alam

[1] Confidence level of 95% and precision of ±5%

Image 2: Fieldwork session at Kolej Universiti Antarabangsa PICOMS

The study was canvassed and administered through online method via MCMC secure online portal. However, the fieldwork, distribution of the survey link as well as hands-on device demonstration and testing to respondents were done face-to-face at the participating HEIs. The first stage of fieldwork was conducted from 26th – 28th January 2022 and second stage was conducted on 16th February 2022. Images 1 and 2 illustrate the fieldwork sessions at UiTM Puncak Alam and Kolej Universiti Antarabangsa PICOMS respectively. The study covered five sections (5) as follows:

a) Part A: Verification and Experience
b) Part B: Awareness
c) Part C: Perception
d) Part D: Demography
e) Part E: Respondent's Agreement

CHALLENGES

Due to the constraints of the COVID-19 pandemic, the study was limited to collecting data only from HEIs within Kuala Lumpur and Selangor. Ideally, having equal number of respondents from each state and federal territory would lead to a more represented finding. However, with most students still assuming online studies, it was a challenge to pre-identify the B40 respondents based on their home state prior to the data collection process. The rise of the COVID-19 cases during the period of the data collection process had also limited the number of HEIs that we could tap into and include in the study, as several of the institutions had to decline or bail out at the last minute due to the sudden cases detected in their facilities.

FINDINGS AND ANALYSIS

Challenges faced by B40 students during online learning

In this new digital age, students must attend their classes in different mode and rely on digital devices and Internet access. However, as shown in Figure 2, majority of the students (98.4%) have experienced online learning challenges. The findings (Figure 3) showed that more students mentioned that affordability and devices are the main challenges in their daily online learning (86.5%) as compared to 81.5% of students who reported Internet access and network as their main challenges. For instance, the top two challenges observed from the study are incompatible devices used by the students as well as unaffordability to buy devices which would jeopardise the students' online learning experience.

Awareness of PerantiSiswa Keluarga Malaysia Package

Prior to the study, 36.5% of students have heard about this package (Figure 4). Of this, more than half of them (56.4%) know about the details of the package such as the devices and service providers involved. In addition, the majority of them (92.9%) are eager to apply for this package. Eight out

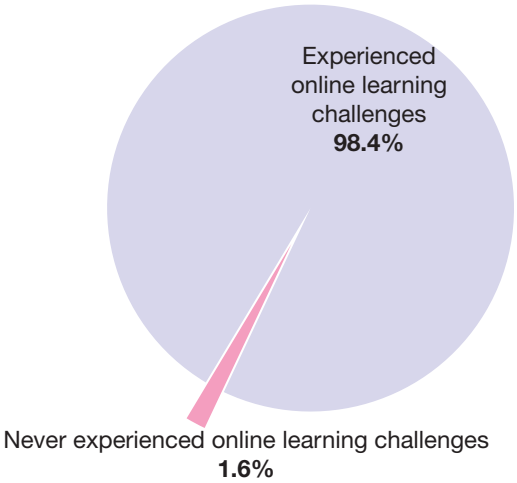

Figure 2: Experience in online learning

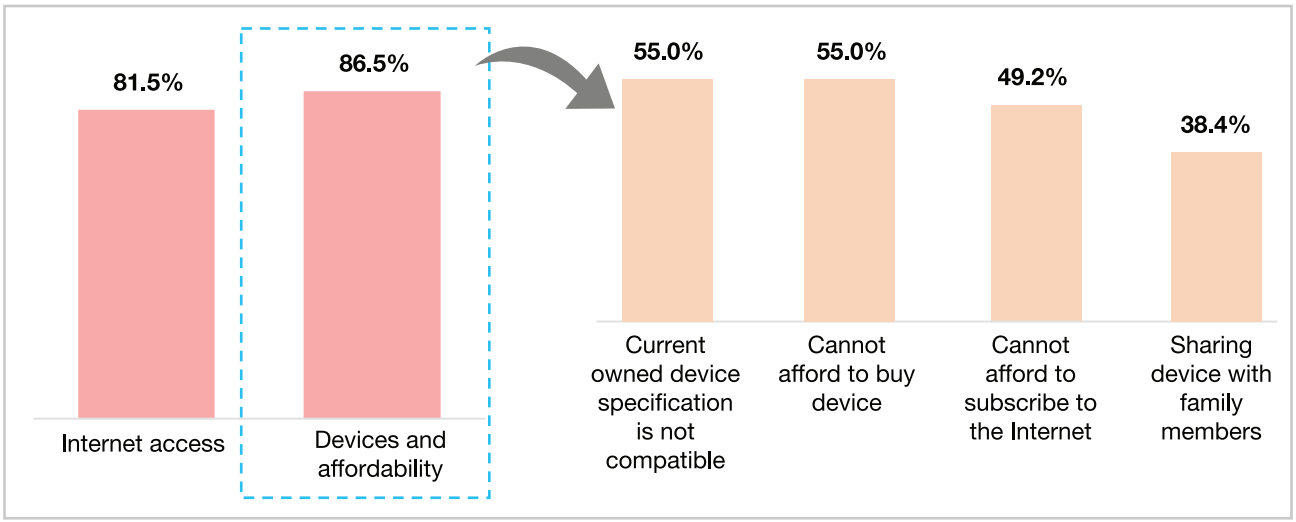

Figure 3: Challenges faced in online learning

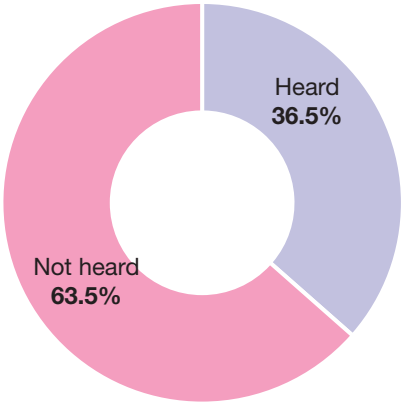

Figure 4: Awareness of PerantiSiswa

of ten (86.2%) of the students who are interested to apply are from families with average household monthly income of RM3,000 and below. This indicates that this group of students feel that the initiative would be very helpful to ensure the continuity of their education.

The source of information was also examined during the study. As expected, social media is the popular medium for students to obtain information about this package (60.0%). Second in the list is news portal (43.6%), followed by information conveyed by family and friends (27.9%) (Figure 5).

Commitment on Package

Implementation of this initiative will also consider the affordability background of the student's family. Thus, this study further explored the student's readiness to commit to the package. Six out of ten (65.0%) students stated that they agree to commit to any payment required for the package, as shown in Figure 6. Of this, 47.3% of students are ready to pay the upfront payment, 40.7% ready to commit to the monthly charges while only 12.1% students agree to pay for both upfront and monthly charges. Table 1 illustrate further details on the range of payment that the students are willing to commit.

On the other hand, it was also observed that 35.0% of the students disagreed to commit to any payment, 71.4% of these students come from families with average household monthly income of RM2,000 and below.

Students' Perception and Acceptance

The study further examined the student's' perception and acceptance of the package and device. This is important to ensure the initiative is effective and provides optimal benefit to students. Overall, based on the study, more than 95.0% of students have a positive perception of the PerantiSiswa Keluarga Malaysia Package.

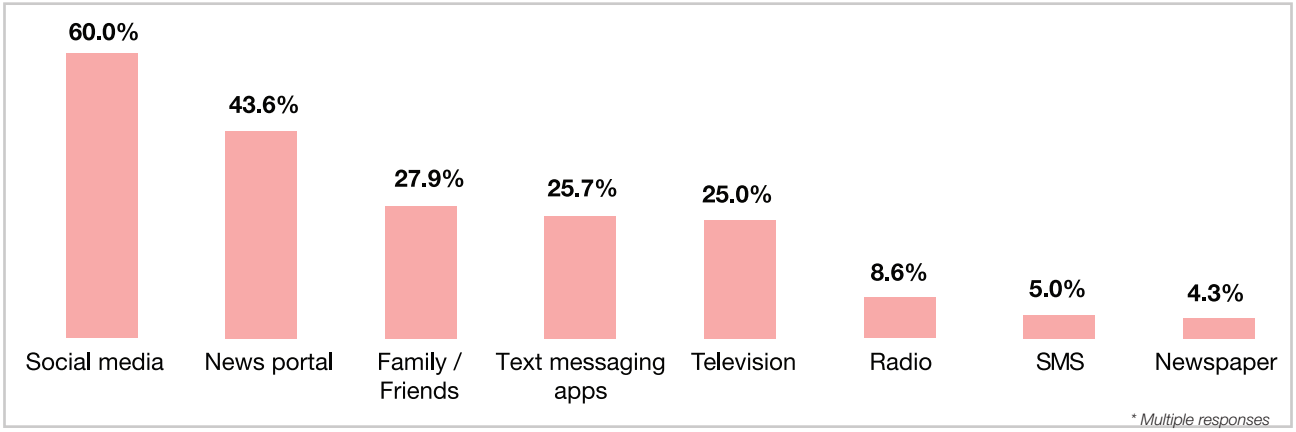

Figure 5: Source of information about PerantiSiswa

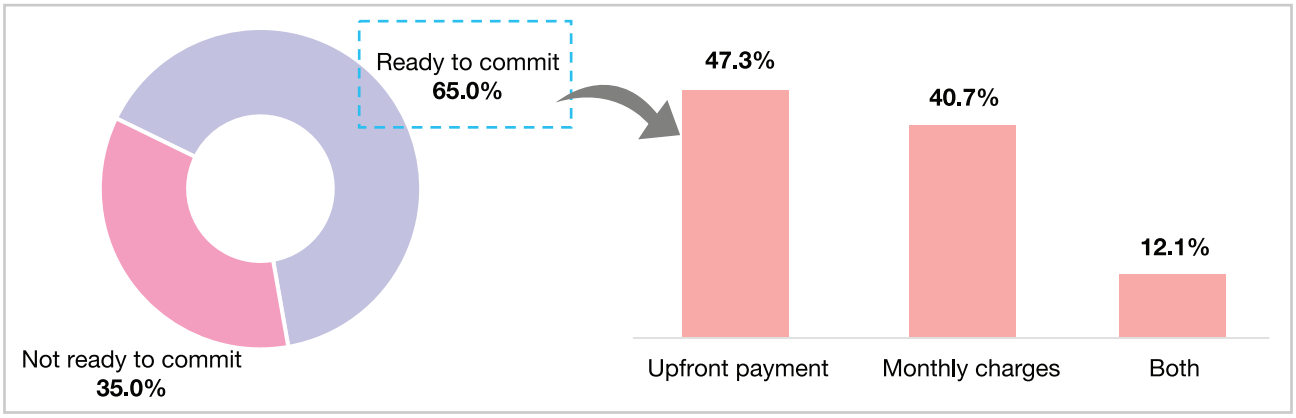

Figure 6: Commitment on package

Upfront payment	%	Monthly charges	%
≤ RM50	72.2%	≤ RM20	41.7%
RM51 - RM70	18.5%	RM21 - RM40	41.7%
RM71 - RM90	1.9%	RM41 - RM60	10.4%
RM91 - RM100	7.4%	RM61 - RM100	6.3%

Table 1: Details on the range of payments that the students are willing to commit to

As affordability is one of the main challenges faced by the students, it is notable that 98.7% of them agreed that the implementation of this package will help reduce their family's burden to provide a suitable device to their children (the student) for online learning. In addition, 96.9% also agreed that having a device through this initiative would ease their online learning as no device sharing is needed and they may use the device for their studies.

This package will also encourage the students to enhance their participation in online classes as 99.0% of them stated that it is very interesting and suitable for online learning. The study also found that many of the students agreed that the package would allow them to access the Internet at a reasonable cost (97.9%) and with a sufficient data quota for their online classes (97.9%). They are also excited and look forward to applying for the package once the call for application is open (97.4%).

Moreover, a huge portion of students agreed that this package is seen as an effort to address the challenges faced by students. It would be very helpful for them particularly in searching for information (98.7%), assisting their online learning (98.2%), and facilitating online communication between lecturers, friends and families (98.4%). Additional features such as a keyboard and stylus would also ease the use of the device (97.4%).

Furthermore, the study also provided students with a hands-on experience on the device suggested for the PerantiSiswa Keluarga Malaysia Package. The hands-on experience increased the percentage of students who agreed that it is helpful for them in searching for information (98.7% vs 99.2%) as well as online communication between lecturers, friends and families (98.4% vs 99.0%) when compared to before their hands-on experience. Besides, 95.8% of students agreed that the device is able to download the applications or software needed for their online learning while 87.5% agreed that the specification of the device is sufficient to support their online learning. Additionally, 83.3% of students are satisfied with the device's voice and sound, 72.2% are satisfied with the quality of the video and 54.1% are satisfied with the storage size.

Overall, 96.6% of the students agreed that implementing this initiative could fulfil their needs for their daily online learning. By looking at the benefit of the PerantiSiswa Keluarga Malaysia Package, 98.7% of students would recommend that their friends apply for it.

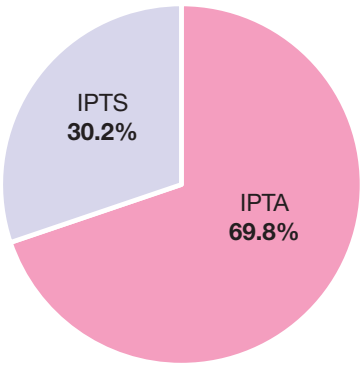

Figure 7: Distribution of students by IHL

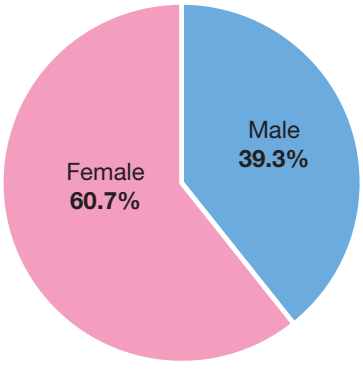

Figure 8: Distribution of students by Gender

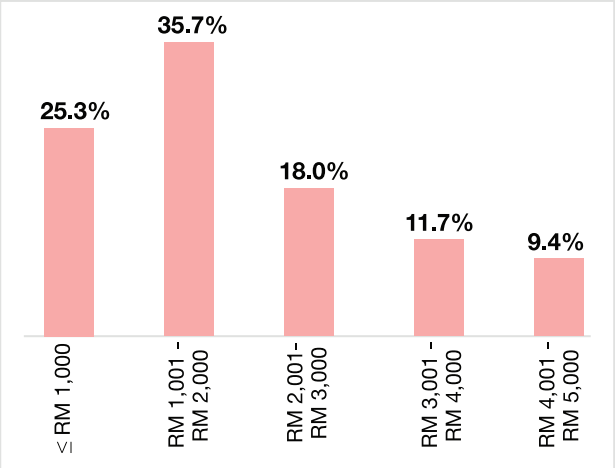

Figure 9: Distribution of students by average household monthly income

CONCLUSION

Overall, most students showed a positive response towards the PerantiSiswa Keluarga Malaysia Package with more than 90% of the respondents agreeing that the package can help their daily online learning process. However, there is still a low level of awareness of the package with 63.5% of respondents stating that they have never heard of the PerantiSiswa Keluarga Malaysia Package prior to the study. Regardless, the majority of them have indicated that they will suggest the package to their peers once the call for application is open. From these findings, it can safely be concluded that the B40 students are excited about the implementation of the Package and are mostly satisfied with the specifications of the device which shall be offered under the Package. .my

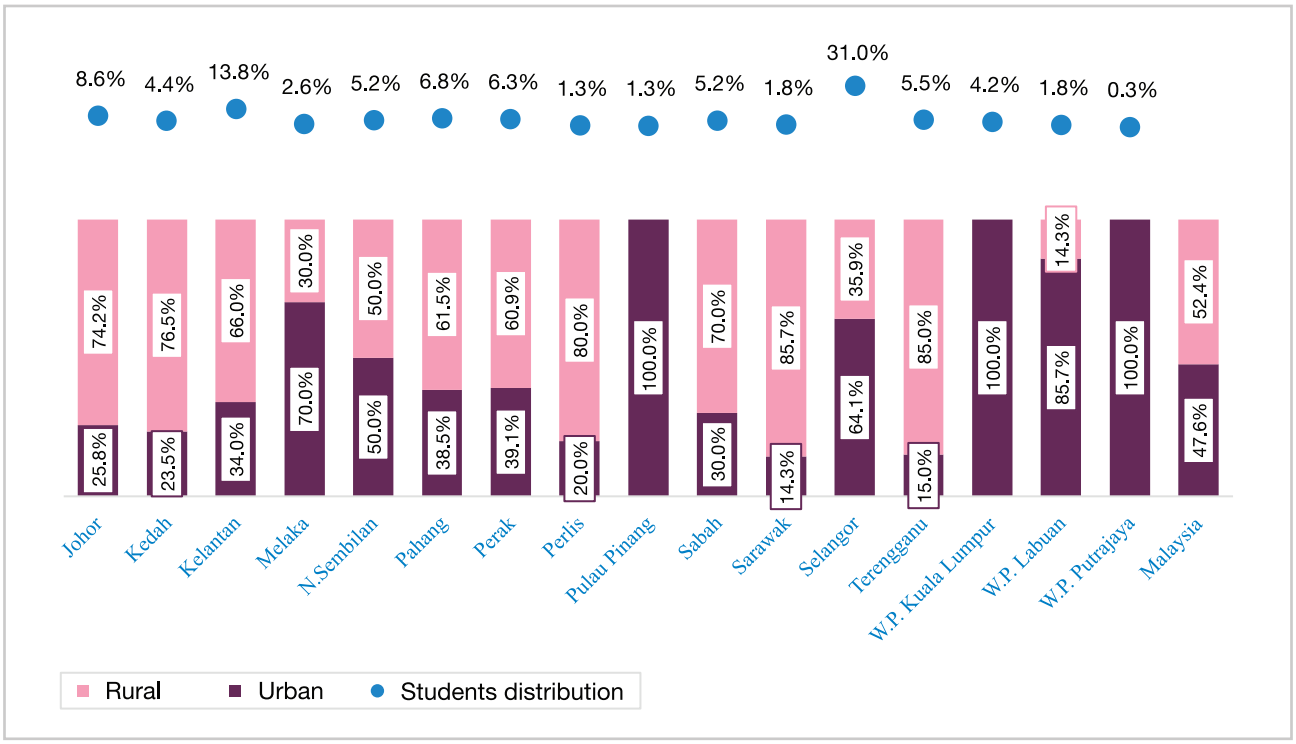

Figure 10: Distribution of students by usual state of residence, by strata

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SARAWAK STATE OFFICE

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The nation is witnessing a digital revolution that is changing the way we interact and engage with one another, leading to broad socio-economic transformation. Technologies shape our livelihoods, our organisational routines and decisions. No matter what industry we are in, we are constantly being nudged to adopt and embrace digital technology in our daily lives.

MCMC's role is instrumental in shaping the growth of the internet economy in our nation, ensuring solid digital infrastructure landscapes to support the country's digital ecosystems while at the same time fostering conducive, safe and secure internet experience for everyone. Where does a State Office fit into this; you might ask? Apart from geographical need, the responsibility to ensure policies and plans are well executed on the ground lies with the State Office. It is here, at the state, that ideas and plans are put to test and applied in a real world. This is where the rubber hits the road.

Undeniably, the State Office is more informed of the needs and challenges in implementing infrastructure projects on the ground. It is this crucial attribute that make up the relevance of the State Office in MCMC. Being an important entity for MCMC, it is pertinent for a State Office to be able to offer sound assessment and analysis from time to time, of the regulatory and developmental needs of the state where it is operating from.

DUM SPIRO SPERO; WHILE I BREATHE, I HOPE

The spirit of the motto from the colonial past of Sarawak; *Dum Spiro Spero*; Latin for *while I breath I hope* seems still relevant in the current atmosphere, exemplifying the determination and hope of the current Sarawak government to continue improving the socio-economic well-being of its citizen including aspects related to digital connectivity. The Sarawak Digital Economy Strategies 2018-2022 (DES 2018-2022) and the Post Covid-19 Development Strategies 2030 (PCDS 2030) are the two key documents developed by the Sarawak government that

guide the path forward to achieve a status of a developed state.

The creation of the two documents demonstrates genuine intent of the Sarawak government to shift the development strategies by leveraging on digital technologies and platforms to accelerate the economic growth of Sarawak to become a developed state by 2030. The two blueprints outline among others, the enhancing of the reach of digital infrastructure, talent development, creation of digital business platforms, application of emerging technologies (precision farming, IOT and other data intensive applications) and regional & international connectivity.

Evidently, Sarawak has its disadvantage or rather challenges in pursuit of development due to its large area size and sparse 2.81 million population. Although Sarawak is one of the six states with large contributions to the national GDP, collectively at 72.1% (Sarawak GDP per capita in 2020 was at RM48,657 in 2020), there are pockets of communities still devoid of access to basic utilities such as treated water supply, grid electricity and of course, access to the internet. The DES 2018-2022 and PCDS 2030 strategic plans aspire to address these constraints, to accelerate the development of infrastructures including digital connectivity, and to enable small economies in the rural areas through digital technologies and platforms. Certainly, MCMC is instrumental in supporting the journey and aspirations of the Sarawak's digital economy agenda with JENDELA initiatives as one of the key enablers in accelerating the transition to the digital economy.

THE EARLY DAYS OF MCMC IN SARAWAK

MCMC Sarawak State Office (Sarawak Regional Office as it was known back then) opened its door in Kuching, Sarawak in 1999 with just one staff formerly from Jabatan Telekom Malaysia. By 2001, the Sarawak State Office moved to a small office with 4 staff. In the early period of MCMC's establishment in Sarawak, the core responsibilities and emphasis were mainly on activities related to Quality of Service, spectrum monitoring and processing of Apparatus Assignment (mainly land mobile and maritime mobile services).

The first rural telecommunication project initiated by MCMC in Sarawak was the provisioning of public telephony access under Community Communications Development Program (CCDP) back in 2002. Rumah King longhouse in Julau District (nowadays Pakan) was selected as the first location for the programme. The scope of programme was expanded and by 2005, Rumah King became the first longhouse in the country to be provisioned with an all-inclusive voice and internet access funded under the Universal Service Provision programme.

The core objective of the CCDP programme was to train the local community on the basic computer skills and use of internet. Under the initiative, the longhouse was equipped with internet access and public payphones with a VSAT backhaul, 5 personal computers and other IT peripherals. A facilitator from Yayasan Salam was entrusted to monitor the facilities and providing training to the local community. The current Pusat Ekonomi Digital Keluarga Malaysia (PEDi) programme is the continuation of the CCDP's broadband collective access concept in terms of access, facilities and community engagement approach. Today, Rumah King enjoys far better internet coverage through 4G mobile broadband and the Pakan community is served by three PEDi establishments.

2004 marked another significant milestone for MCMC in Sarawak as it oversaw the first broad implementation of

Figure 1: MCMC premises in Sarawak

Typical day to day activities of staff at Sarawak State Office. Left: Network performance testing exercise by a team from the Regulatory Section and Right: Infrastructure audit exercise by a team from the Development Section

the Universal Service Provision programme. The scope of the programme involved the provisioning of residential and public payphone facilities in the districts where the penetration rate for basic telephony service was 20% below the national penetration rate. A total of 25 districts in Sarawak benefitted from the initiative.

STATE OFFICE TRANSFORMATION

Fast forward to 2016, the Sarawak State Office moved to its own seven story office in the town centre of Kuching. At present, MCMC has four offices across Sarawak; a State Office and three Branch Offices strategically located at the other three major cities of Sibu, Bintulu and Miri. Each of the Branch Offices assume similar operational functions of a State Office albeit at a smaller scale. Sibu and Bintulu Branch Offices focus on the central region area and Miri Branch Office focuses on the northern areas of Sarawak.

With an area size of 124,450 km^2 and a population of approximately 2.8 million, the establishment of Branch Offices is vital to ensure efficient operation and resource optimisation in serving the public and other relevant external stakeholders.

Diversity is one of the fundamental elements to consider towards achieving a balanced and inclusive workplace environment. Women make up 44% of the total workforce at Sarawak State Office, with representation at every level of job grade. Diversity in terms of gender, ethnicity, cultural and educational background contribute to unique perspectives at the workplace when approaching issues and solutions. Having a diverse ethnicity for instance is vital when it comes to engaging stakeholders in the various regions in Sarawak, with the northern interiors of Sarawak area consisting mainly of Orang Ulu and the central and western regions being mainly Iban, Malay, Bidayuh and Melanau.

The operation at the State Office is mainly divided into two domains, Regulatory and Development. The Regulatory Section primarily undertakes consumer protection, compliance and spectrum monitoring. It regularly conducts network performance testing and interference investigation exercises involving fixed and mobile broadband services. The Development Section meanwhile assumes the planning, implementation and monitoring of infrastructure projects in the state. It also undertakes advocacy and administrative tasks at the State Office. The roles of these two Sections are mirrored at Branch Offices, led by the Heads of Branch Offices.

WHERE THE RUBBER HITS THE ROAD

The Jalinan Digital Negara (JENDELA) plan was formulated to provide wider coverage and better quality of broadband experience for the Rakyat, whilst preparing the country for 5G technology. The MCMC State Offices play important roles in ensuring the JENDELA strategies and plans are efficiently executed on the ground.

2020 to 2022 is a critical period for the Sarawak State Office with the implementation of highly critical infrastructure projects under the JENDELA Phase 1. The estimated investment costs for JENDELA Phase 1 for Sarawak are at slightly over RM4 billion involving 4 key initiatives namely:

1. The expansion of high speed fixed broadband access to more than 116,000 residential and business premises;
2. Expansion of mobile broadband coverage through the construction of more than 800 new telecommunication towers;
3. Upgrading of nationwide cellular network from 2G/3G to 4G involving more than 3,000 base stations; and
4. Deployment of broadband wireless access (satellite broadband connectivity) at 523 locations mainly in areas totally devoid of any kind of communication service.

Logistics challenges in bringing connectivity to rural areas of Sarawak

ACHIEVEMENTS

Over the last two decades, there has been a steady improvement in terms of coverage and quality of communications services in suburban and rural areas of Sarawak. This positive development is mainly due to the various implementations of infrastructure projects undertaken by MCMC through the USP fund as well as by commercially driven initiatives. The broadband penetration rate for Sarawak in 2010 for example was at 40.2% compared to over 100% in 2021. The 4G coverage in populated area meanwhile reached 82.86% as of Quarter 4 2021. To date there are over 2,400 landed communication structures established through commercial and MCMC led cellular coverage expansion programmes such as the TIME 2, TIME 3 and JENDELA Phase 1.

There are currently 129 PEDi establishments throughout Sarawak with more than 100,000 registered users. The PEDi initiative so far has generated more than 3,066 active entrepreneurs, guided through various entrepreneurship activities. The roles of PEDi are certainly becoming more critical in the years to come. From a mere objective of providing collective access to broadband and IT literacy trainings in the beginning, PEDi has emerged to be the one stop centre of digitalisation for communities in sub urban and rural areas. It sets to improve the socio-economic conditions of communities surrounding the PEDi, empowering small entrepreneurs to expand their market reach through various digital entrepreneurship activities conducted in collaboration with private sectors.

The various development initiatives by MCMC benefit not only end consumers. They also impact enterprises, especially the small and medium size businesses, who also benefit from the various business opportunities stemmed from the infrastructure projects.

CHALLENGES

To expand the reach of affordable and quality internet connectivity in the state of Sarawak calls for huge investments. With the landmass almost equivalent to Peninsular Malaysia, logistics issues are inevitable with many areas still hard to reach. The construction of telecommunication towers in rural areas such as in Ulu Baram at the northern part of Sarawak would thus cost significantly more than in urban areas.

Without adequate supporting infrastructures such as integrated roads and grid electricity, efforts to bring quality internet connectivity may take extended times. The use of alternative power sources such as diesel generator or solar energy to generate electricity for telecommunication towers are costly to deploy and maintain and may not be able to support power output requirements.

It is important to acknowledge that every state has its own perspective and focus on development. Given the unique position and socio-economic fabrics of Sarawak, the Sarawak Digital Economy Strategies 2018-2022, seen as a mission to leapfrog Sarawak into digital economy agenda, and the creation of the Sarawak Multimedia Authority (SMA) are testimonies to this mission, which is to accelerate the development of digital infrastructures, talents and ecosystems, as these are the important components of the digital economy.

The SMA was established with the objective of managing and facilitating the development and implementation of the state's digital economy initiatives including expansion of digital infrastructures in rural areas. Though there seems to be similar roles between MCMC and SMA, it should not dissuade the commitments of both organisations to improve the state of connectivity in Sarawak. Both must continue finding the appropriate balance of accountability, fostering collaboration rather than competition.

LEGACY

Improving the reach of digital connectivity in Sarawak is by no means an easy task. A lot of sacrifices, sweat and tears have gone into fulfilling the responsibility. Knowing that you have made a difference in the livelihood of the people especially in the rural areas is the most rewarding part of the job. Investing one's energies and time into meaningful efforts to bring digital reach and improve the livelihood of the community especially those in rural areas is the most satisfying feeling one can have. .my

RESTORING COMMUNICATIONS AFTER DISASTERS

HOW MCMC AND THE INDUSTRY CAME TOGETHER TO RESTORE COMMUNICATION SERVICES DURING THE FLOOD DISASTER

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The torrential downpour in the Klang Valley and the central west coast starting on 17 December 2021 caused a catastrophic flood in several areas in Selangor. Even though the Malaysian Meteorological Department (MET Malaysia) had earlier issued a thunderstorm warning, many were caught off guard by the intensity of the rain which caused a massive flood in Klang, Shah Alam, Petaling, Dengkil and Hulu Langat, Selangor. According to Environment and Water Ministry (KASA) secretary-general Datuk Seri Ir Dr Zaini Ujang, the heavy downpour that lasted over 24 hours beginning late December 17 was equal to the average rainfall for a month, making it a once in 100 years weather event[1]. Apart from Selangor, the other states that hit by floods were Wilayah Persekutuan, Pahang, Terengganu, Kelantan, Melaka, Negeri Sembilan, Perak and Johor.

Federal and state disaster management committees mobilised all assistance and assets under their administration. Overall, 66,015 personnel from enforcement agencies were involved, comprising the Police, Armed Forces, Fire and Rescue Department, Civil Defence Force, Public Works Department, Social Welfare Department and local authorities. They jumped into action to rescue victims trapped in areas that were badly affected, such as Hulu Langat, Taman Sri Muda, Sepang and Kuala Langat[2].

DISRUPTION TO COMMUNICATIONS SERVICES

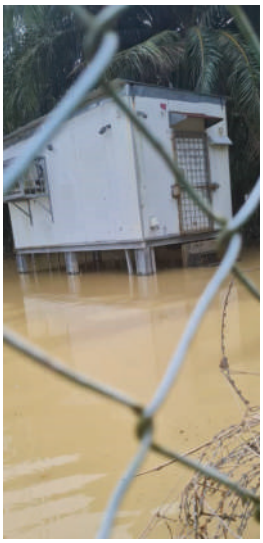
As the water rose on 18th December 2021, many communications structures and base transceiver stations (BTS) were greatly affected. Cellular and fixed communications services such as voice and data were disrupted. Service Providers (SPs) reported that many of their sites in the affected area were submerged or down due to power outages as Tenaga Nasional Berhad (TNB)

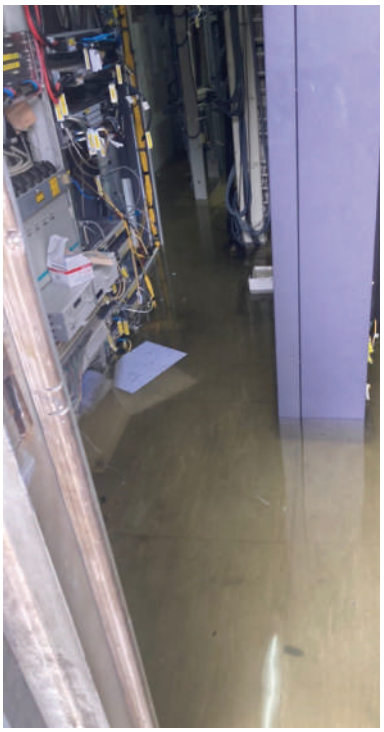
[1] 'Once in a hundred years weather event' - https://www.nst.com.my/news/nation/2021/12/756035/once-hundred-years-weather-event
[2] Floods: Priority is saving lives, delivering food - PM - https://www.bernama.com/en/news.php?id=2035343

Areas in Selangor affected by the flood (The Star) December 22, 2021

power substations had to cut their supply to ensure the safety of the residents and the structure itself.

The need for communication was really high during the disaster especially for the relevant agencies such as National Disaster Management Agency (NADMA) at the Flood Operation Command Centre (PKOB) that was coordinating and executing rescue missions. Victims in the Temporary Relief Centres (PPS) that could accommodate up to 1,500 victims were also affected by the disruption. MCMC and the service providers were aware of this great necessity during the crisis and together fulfilled their responsibility and commitment to restoring the services.





Communication structure and equipment affected by the flood


MCMC Involvement and Collaboration with Disaster Management Agency from Federal and State Government

REGULATOR, INDUSTRY AND STAKEHOLDERS COLLABORATION

On 18 December 2021, MCMC, at the Selangor state level, immediately activated the Emergency Disaster Response Team (EDRT) with all key Service Provider (SP) representatives. The EDRT aimed to:

- Identify the number of structures affected by each SP by district on a daily basis.
- Identify the cause of disruption ie. Equipment submerged, power outages, structure collapsed, no access etc.
- Compile the total number of structures disrupted and restored by district.
- Establish a plan and measures for site restoration taking into account the safety risks that have been identified.
- Give priority to providing and improving communications in PKOB and PPS.
- Provide progress updates of the status of communications services to the management and state government.

As the flood receded, MCMC actively engaged with the state government to identify areas that needed immediate communications. Priority was given to providing and improving communications in PKOB and PPS. MCMC also conducted site visits to measure the quality of communication services at the location of the restored structures. MCMC and SP also took steps to provide portable generators at infrastructure locations without electricity supply, as well as the installation of Coverage on Wheels (COW), a mobile transmitter system that provides temporary service coverage, which is commonly used by service providers during disasters and emergencies.



Configuration and Installation of network equipment in Base Transceiver Station

Installation of Mobile Generator Set (Gen Set) at the Affected Communication Structure

Installation of Coverage on Wheels (COW) - a mobile transmitter system to provide temporary service coverage while MCMC SSO officers perform quality test






MCMC SSO Site Visit and Network Quality Measurement at the affected structures and PKOB

During the flood disaster, MCMC Selangor State Office received reports from SPs namely Celcom, Digi, Maxis, U Mobile, Webe and YTL, where a total of 367 Base Transceiver Stations (BTS) were affected by the flood. Petaling, Klang and Sepang districts recorded the highest number of affected BTS with 138, 105 and 68 BTS respectively. As of 1st January 2022, 360 (98%) of the BTS have been successfully restored and communications service has successfully resumed (Table 1).

In the category of SPs, Digi, Celcom and U Mobile topped the list with 136, 76 and 59 BTS affected respectively. This was followed by Maxis, Webe and YTL with 41, 30 and 25 BTS affected (Refer to Table 2). It shows that within two weeks the SPs put in tremendous effort to restore services by activating 98% of total BTS in Selangor.

District	Status		
	Down	Up	Total
Petaling	1	137	138
Kuala Langat	0	16	16
Klang	3	102	105
Sepang	2	66	68
Kuala Selangor	0	19	19
Hulu Langat	1	19	20
Gombak	0	1	1
Sabak Bernam	0	0	0
Hulu Selangor	0	0	0
Total	**7**	**360**	**367**

Table 1: BTS affected by District

CHALLENGES DURING RESTORATION

The biggest challenge to communications in a flood disaster, is, of course, the damage to the communication and radio equipment. The electronic equipment became unusable if submerged and replacement was dependant on stock availability. The other challenge is power outages. Communications service is not available when the BTS is not functioning due to power outage. This is usually due to the electricity supply from TNB being cut to ensure the safety of the residents. If the circumstances permit, a generator set (genset) will be deployed. The third challenge is access restriction by road or boat to affected sites due to high water levels or safety concerns of the responsible agencies.

Service Provider	Down	Up	Total
Celcom	1	75	76
Digi	1	135	136
Maxis	0	41	41
UMobile	2	57	59
Webe	0	30	30
YTL	3	22	25
Total	**7**	**360**	**367**

Table 2: BTS affected by SP

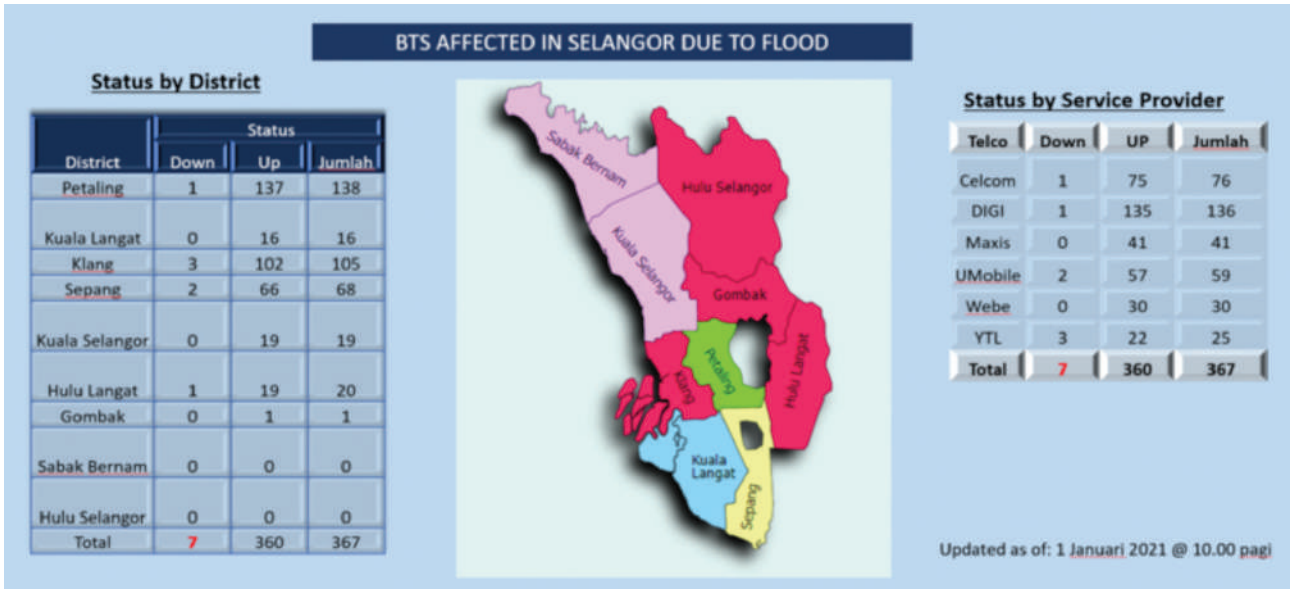


Figure 1: Status of BTS affected in Selangor

OPS BANTU HINGGA SELESAI (OPS BAHIS)

In carrying out the responsibility and commitment toward restoring the communications structures, MCMC and the Industry did not forget the plight of the flood disaster victims. MCMC, with six SPS participated in Ops Bantu Hingga Selesai (Ops BAHIS), an initiative led by the Ministry of Communications and Multimedia (K-KOMM) with the support of its agencies to help Malaysians affected by the recent floods.

The six SPs, namely Celcom, Digi, Maxis, U Mobile, Telekom Malaysia Berhad (TM) and TIME dotCom Berhad (TIME) also extended financial assistance to affected staff and assisted with cleaning works of their premises. Collectively, the industry has allocated more than RM25 million to support flood relief efforts, including restoring 99% of services and mobile networks in all flood-affected areas.[3]

The 5-day programme took place from 29th December 2021 to 2nd January 2022 with the objective of easing the burden of the unfortunate families by mobilising

Challenges during telecommunication structure and BTS restoration

[3] https://www.kkmm.gov.my/en/public/news/21197-ops-bahis-six-telcos-lend-support-for-ministry-s-initiative

volunteers from their respective organisations to carry out cleaning work and provide other support in homes severely affected by the floods.

MCMC and the industry will continue to monitor the situation and work with other relevant authorities to support Malaysians in facing this difficult period together and to rehabilitate the affected locations, including working with local authorities to place equipment to ensure connectivity.

telecommunications industry, steps have been initiated since past disaster experiences. SPs have been instructed to perform risk assessments on their structure such as hardening their telecommunications structures and raising up the plinth for equipment, power supply, and other measures to reduce the consequences of natural disasters. Other measures and steps must be taken to ensure communications services are in satisfactory condition or can be restored immediately in the event of disaster.

K-KOMM Minister, MCMC and volunteers distributing flood relief items

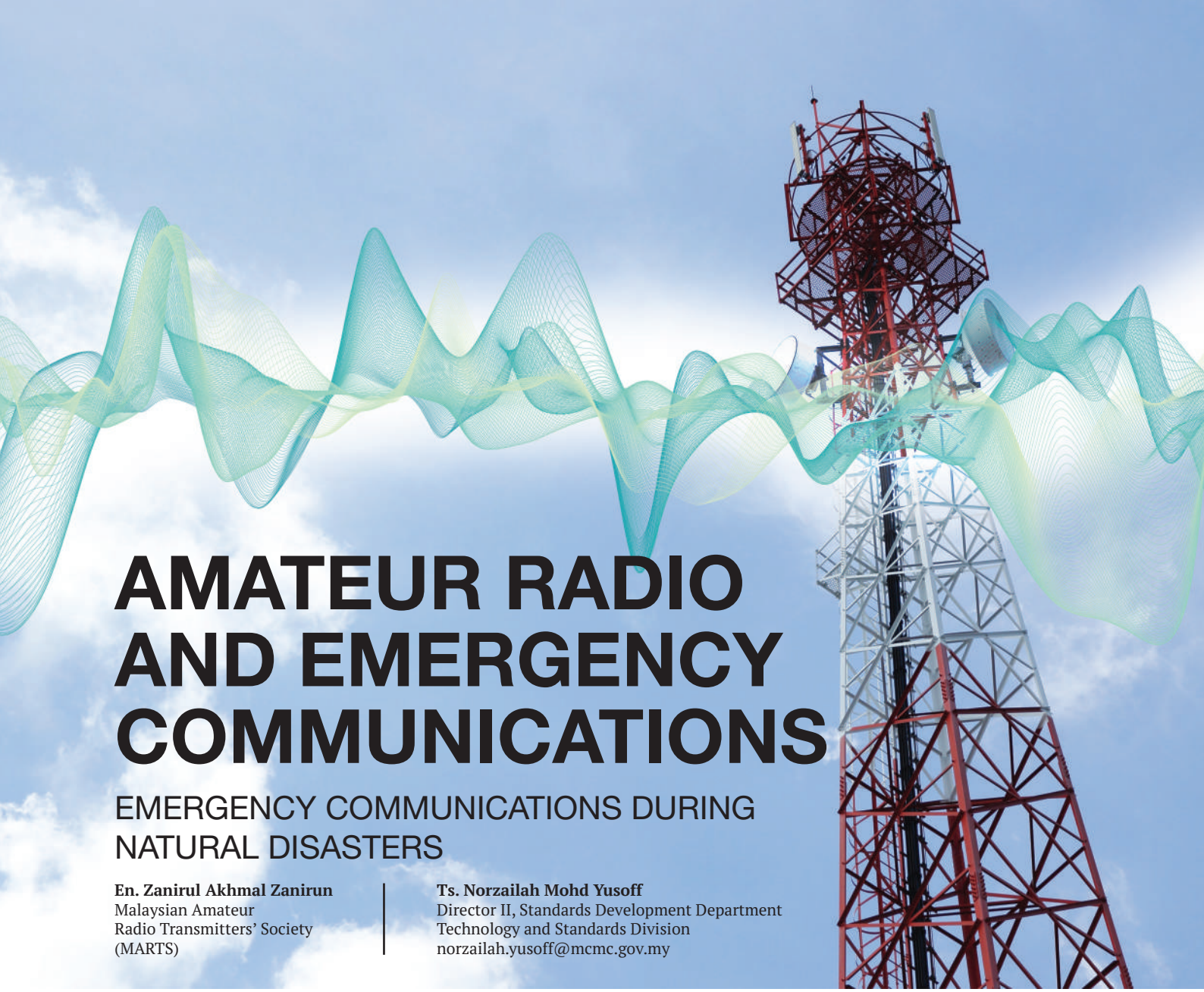
MCMC Management team and MCMC volunteers performing communal work in the Bukit Changgang Mosque

LESSON LEARNED FROM THE FLOOD DISASTER

In conclusion, natural disasters like the recent massive floods caught many by surprise especially in the Klang Valley. People were not prepared to face a natural disaster of this magnitude. It serves as a reminder to the government, agencies, stakeholders and all citizens for disaster preparedness. Processes and procedures for disasters should be put into place and practiced by the relevant agencies. As for MCMC and the

Nevertheless, this disaster also taught Malaysians about the elements of humanity. Strategic partners united and worked together to provide all kinds of assistance in the affected areas regardless of background, race, ethnicity and politics. Hopefully, this noble effort will continue to spread to all members of the "Keluarga Malaysia". .my

MCMC volunteers carrying out communal work at affected homes in Labohan Dagang,



AMATEUR RADIO AND EMERGENCY COMMUNICATIONS

EMERGENCY COMMUNICATIONS DURING NATURAL DISASTERS

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Malaysia has experienced several natural disasters and emergency scenarios where the main communications infrastructure and services (mobile phones, landlines, Internet, etc.) were not available, fail or become overloaded. Examples include the Highland Tower collapse, tsunami from the Indian Ocean impacting Langkawi Island, the Bukit Antarabangsa landslide and most recently, the major floods in Shah Alam and Klang areas at the end of 2021.

Usually, during the first few days of a natural disaster or an emergency, the power supply to the affected areas is cut off, perhaps due to flooding or other reasons brought about as a result of the disaster. Consequently, the power supply to the base station or telephone exchange will also be affected. In these instances, impacted communities are disconnected from contact with emergency and response agencies such as the Royal Malaysia Police (PDRM), Fire and Rescue Department (BOMBA) or National Disaster Management Agency (NADMA).

Most government agencies have their exclusive radio network and connect through Government Integrated Radio Network (GIRN). However, the network may also be impacted by natural disasters. Additionally, there are many agencies and non-governmental organisations (NGOs) that do not have their own radio communications and rely on commercial cellular services for their coordination and logistic support. When multiple jurisdictions and mutual aid are involved, the disruptions to the commercial cellular networks due to the disaster can become a problem and hinder disaster relief efforts.

Fortunately, when all else fails, the amateur radio service can often help. Also known as ham radio, the operators of these services have stepped in to provide assistance when other forms of communication fail. The advantages of amateur radios in a disaster situation are twofold; they are free from requiring large infrastructure and are incredibly flexible bits of technology. An emergency operation system might need a big generator to keep things going, but amateur radios can get by with batteries or solar power.

Ampang, Highland Tower Collapse, 1993

Langkawi Island, Indian Ocean Tsunami, 2004

Bukit Antarabangsa Landslide, 2008

Shah Alam Flood, 2021

Disaster occurrences in Malaysia

WHAT IS AMATEUR RADIO SERVICE?

Amateur radio service might be considered a precursor to the social media of today, with initial contacts between radio stations taking place in the 1890s. It was first introduced to Malaya in the late 1920s. Amateur Radio Service exists in nearly every country and utilises the same frequencies as in Malaysia.

In Malaysia, amateur radio is regulated by the Malaysian Communications and Multimedia Commission (MCMC). To operate an amateur radio station in Malaysia, an operator must have an Amateur Radio Operator's Certificate (AROC) and an Amateur Station Apparatus Assignment (ASAA).

The amateur radio service is defined in the Communications and Multimedia (Spectrum) Regulations 2000 as "a radio communications service (covering both terrestrial and satellite) in which a station is used for the purpose of self-training, intercommunication and technical investigations carried out by authorised persons who are interested in radio technique solely with a personal aim and without any pecuniary interest".

Millions of radio amateurs communicate daily with each other directly or through relay systems and amateur satellites. Amateur service may provide an alternative for emergency communications in times of natural disasters. Radio amateur communication is able to provide support communication during a disaster where commercial communications systems are unavailable, due to the uncomplicated deployment of an amateur radio station.

Amateur radio has been recognised as an important part of the radio community. It is one of the 49 radio services in radiocommunication services spelt out in the International Telecommunication Union (ITU)'s Radio Regulations (RR). ITU has allocated common frequency bands on a sharing basis to all amateur radio stations around the globe.

Ad hoc setup for amateur radio service

Example of an Emergency Mobile Communication Centre


MARTS amateur radio station at RTM Angkasapuri during 2014 flood

Besides provision for emergency communication, licensed radio amateurs of the public are able to carry out experiments on radio and conduct regular radio communication with similarly licensed radio amateurs on a non-commercial basis.

Amateur radio is officially represented and coordinated by the International Amateur Radio Union (IARU), which has members from each country's national amateur radio societies. The core purpose of amateur radio, as quoted from IARU, is to provide an accessible way that people can enjoy and personally grow from experimentation with, and utilisation of, the radio spectrum, bringing together like-minded people in a community of common interest and offering social and economic benefit to others in our areas of expertise.

AMATEUR RADIO OPERATORS' SUPPORT DURING DISASTER MANAGEMENT

There are over 30 amateur radio societies in Malaysia. One of them, the Malaysian Amateur Radio Transmitters' Society (MARTS), is the oldest established national amateur radio society and is recognised by IARU. In the interest of their members, MARTS has established a national radio repeater linking the VHF and UHF spectrum. The spectrum used is the one allocated to amateur radio exclusively or on a shared basis. This is supplemented with HF radio communication, EchoLink, Automatic Packet Reporting System (APRS) and others. In a time of emergency, traffic carrying emergency information will be given the utmost priority.

MARTS has played an active role in providing support during emergencies. One instance is during the major flood in Kelantan in December 2014. Members of MARTS assisted the authorities in coordinating the operation of disaster management in the area and supplied to RTM first-hand news regarding the situation in the affected areas. The Chairman of MCMC, President of MARTS and Director General of Broadcasting supervised the operation at base headquarters at RTM and operated the equipment to the extent possible. The operation at RTM lasted for three days, while radio amateurs continued at the affected areas until the restoration of service was completed.

Apart from that, MARTS were also actively involved together with other amateur radio societies in providing amateur radio communication support to the authorities and NGOs during the tsunami in 2004 and 2005, the landslide at Bukit Antarabangsa, Ulu Kelang, Selangor in 2008, and recent floods in Hulu Langat, Shah Alam and Temerloh.

CONCLUSION

Effective information flow among various parties is very important to managing a disaster efficiently, irrespective of the size or magnitude of the disaster. Amateur radio services like the one operated by MARTS give tremendous assistance to all agencies and NGOs on site or with their national centres. Amateur radio may operate on a small budget, but the existence of skilled operators with up-to-date and maintained equipment makes a lot of difference at times when no other form of communication is accessible.

In order to fully appreciate the effectiveness of amateur radio service at any time, the communication skills and techniques must be practised regularly. The public is also encouraged to attend the relevant training and obtain the amateur radio operator's certification. Those who wish to learn more about amateur radio and how to become a certified member can refer to MCMC's website at https://www.mcmc.gov.my/en/faqs/spectrum-use/mobile-services/are-there-any-special-requirements-for-aa-stations. .my

RURAL PARCEL DELIVERY SERVICE

POSMEN KOMUNITI SERVE GROWING RURAL COMMUNITIES' E-COMMERCE NEEDS

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The Community Postmen, widely known as *Posmen Komuniti (PK)*, is a component of the Sabah & Sarawak Postal Transformation Plan or *Pelan Transformasi Pos Sabah Sarawak (PTPSS)*. It is a collaboration between MCMC and POS Malaysia initiated in 2010 to address mail delivery coverage issues in the rural areas of Sabah and Sarawak. PKs are locally appointed postmen aged 18 to 65 year-old community folks whose aim is to expand door-to-door mail delivery services primarily to rural areas. Individuals appointed are mostly community leaders or entrepreneurs contracted by POS Malaysia to deliver letters to their respective communities or villages outside POS Malaysia's delivery coverage areas.

The PKs play a significant role in connecting the rural communities with the larger part of societies in Sabah and Sarawak via postal service. Today, the PKs have become more relevant in the context of the growth of e-commerce nationwide.

POSMEN KOMUNITI AS RURAL OUTREACH AGENTS

Due to the limited network, it is expensive for courier companies to deliver to rural areas in East Malaysia. On the other hand, PKs have seen a significant decline in mail delivery, in contrast to parcel volume. Hence parcel delivery would be the right approach to offset such a deficit whilst optimising their roles. Conversely, sharing the PKs with other courier industry players could improve the livelihoods of these rural outreach agents.

PKs are more than just regular delivery guys who complete the last-mile delivery to customers. They are unique in that they ensure the rural communities in Malaysia are connected to the other parts of the nation. This arrangement safeguards the rural community from being disconnected from postal services. For instance, any notice from the court is still handed to persons of interest via hardcopy material. PKs ensure any important notification is transported and delivered to the customer

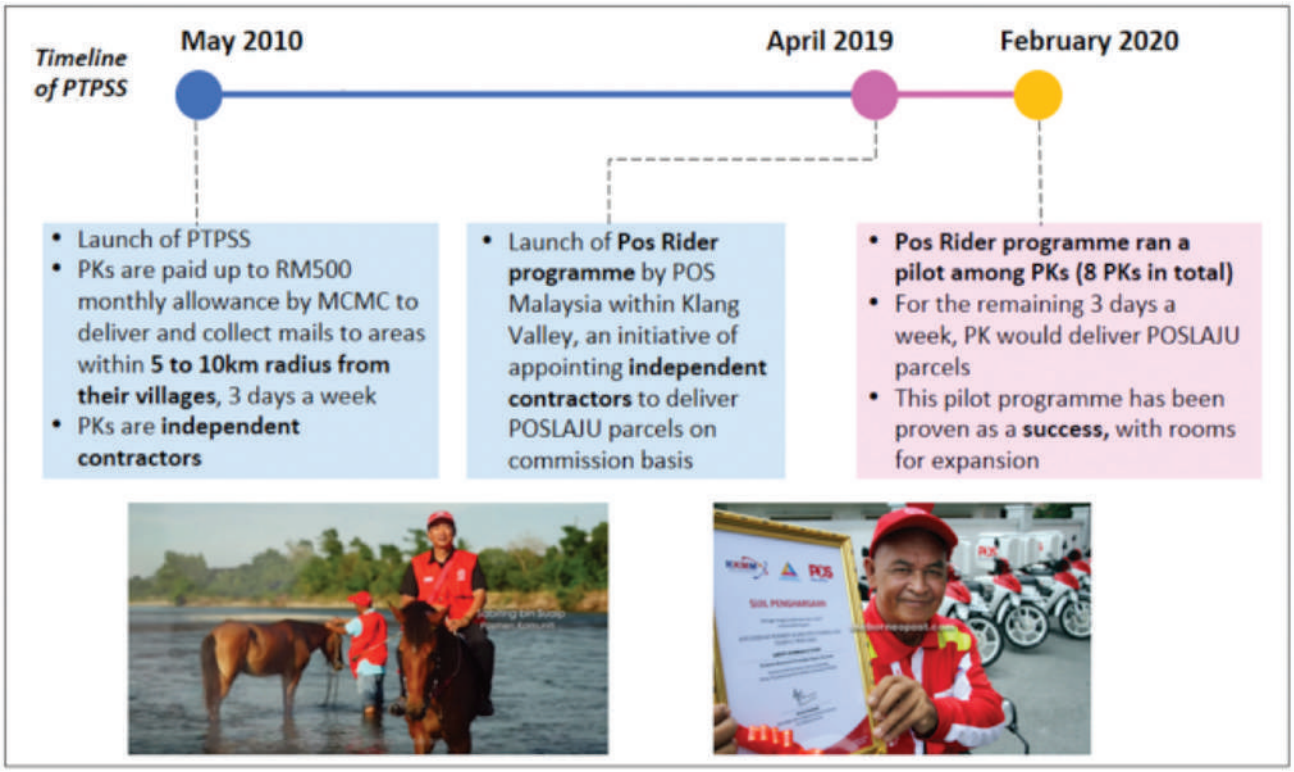

Figure 1: Chronology of rural postal developmental stage in East Malaysia

safely, without any delay in delivery service. Today, the PKs have become more relevant in the context of the growth of e-commerce nationwide. Under PTPSS, 500-odd PKs were appointed in East Malaysia to facilitate the delivery of mail to rural areas and recently extended to parcels, as depicted in Figure 2.

RURAL PARCEL DELIVERY SERVICE WITHIN RURAL E-COMMERCE SYSTEM

The e-commerce industry in Malaysia is continuing to grow steadily, fueled in part by the COVID-19 pandemic. Citizens nationwide are starting to realise the benefits of online shopping and slowly adapting to the online lifestyle. Under the five-year strategic roadmap for the national postal and courier known as P*elan Accelerator Kurier Negara (PAKEJ)*, MCMC in collaboration with the industry has identified the PKs as strategic resources that can be leveraged to improve the growth of e-commerce in rural areas that is somewhat hampered due to the dispersed population density and challenging geographical terrains.

Under PAKEJ, PKs are being leveraged for delivery asset sharing and collaboration initiatives between POS Malaysia (POSM) and other courier companies under a collaborative programme called Program Perantis Posmen Komuniti (P3K). P3K could help lower delivery costs and expand network coverage to East Malaysia. In addition, the initiative will improve the utilisation of PKs and provide additional income to the riders that compensate for the declining mail volumes. Furthermore, value-added features such as mobile online delivery embedded into the P3K scheme could improve the livelihood of PKs.

Figure 2: PKs have deep anchorage with rural communities in East Malaysia

P3K was initiated as part of PAKEJ to achieve the following:

a) Expand the network coverage for courier industry players while improving the livelihood of the Posmen Komuniti.
b) Add last-mile parcels to support the projected e-commerce Industry growth.
c) Optimise cost of delivery and expansion of network coverage.

Under the newly incepted program, the PKs could earn incremental income in addition to the fixed monthly allowance of RM500 by discharging their parcel delivery duties over the remaining days of the week beyond the contractual three (3) times a week.

MOBILISING P3K INTO MOTION

A Working Group comprising industry players including POS Malaysia, GDEX, Skynet, J&T and Citylink was formed to explore opportunities and the feasibility of leveraging PKs to deliver courier items. POS Malaysia, GDEX and Skynet have come forward to participate and initiate the P3K pilot project from March to December 2021. The distribution of the PK workforce is represented in Figure 3.

An initial target to deploy 100 PKs was set for this pilot. From the total number of PKs who are already on contract with POS Malaysia, a quota of 20 PKs was to be made available as shareable resources to GDEX and Skynet based on the following principles:

a) GDEX and Skynet to sign an agreement with the selected PK to appoint them as their delivery agent in their respective delivery areas;
b) The appointed PKs shall deliver items for GDEX/Skynet only when they are not on duty for POS Malaysia;
c) The appointed PK shall be entitled to revenue/commission, with the quantum to be mutually agreed upon with the licensee;
d) GDEX/Skynet may provide necessary supporting tools/equipment/materials for PKs to discharge their duties; and
e) GDEX/Skynet to undertake essential training and guidance for the PK to carry out their duties effectively.

POS Malaysia started the pilot in March 2021 by mobilising 85 PKs from 25 areas in Sabah and Sarawak. Subsequently, throughout April to May 2021, GDEX identified 8 PKs for the areas of Julau and Selangau in Sarawak, while Skynet focused on Semporna with 10 PKs.

The following are some initial key highlights of the P3K rollout:

a) At the kick-off in March 2021, 85 PKs from 25 areas participated. By Q2 2021, a total of 103 PKs (52 in Sabah and 51 in Sarawak) were involved in this pilot, covering 35 areas.
b) The current scope of work of the PKs under POS Malaysia allows them to deliver all items carried by the company, and therefore no new agreements are required to be signed between both parties.
c) Typically, the PKs will collect the POS Laju items when they report to their respective delivery branches to collect mail items. The registration and delivery tracking process of the POS Laju items is currently done manually. The proof of delivery will be recorded in POS Laju's tracing system once they return to the branches during the next visit.
d) Some selected PK-bases offered to participating courier companies (e.g. GDEX and Skynet) need to be rationalised due to irregular volumes generated there.

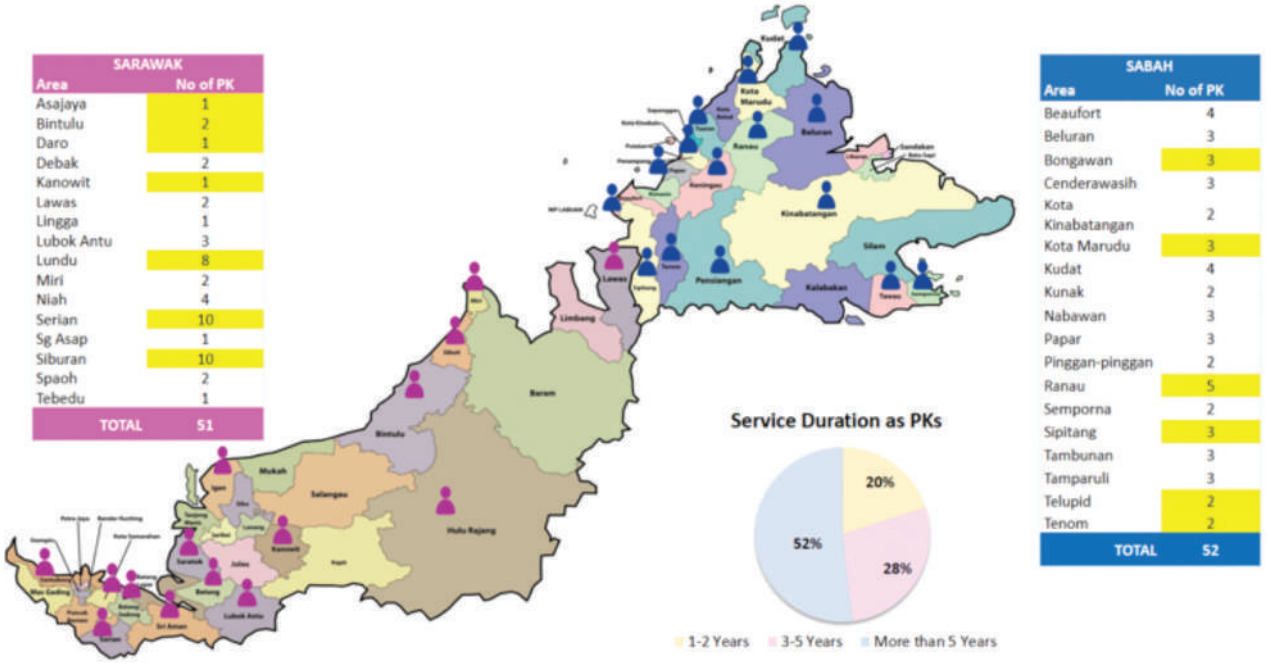

Figure 3: Demographics of PKs and Locations

Figure 4: Daunting facets of rural parcel delivery in East Malaysia

e) Key districts that registered high volume carried by PKs are as follows:
   - Sabah: Bongawan, Kota Marudu, Ranau, Sipitang, Telupid, Tenom
   - Sarawak: Asajaya, Bintulu, Daro, Kanowit, Lundu, Serian, Siburan

f) In addition to their monthly allowance received from Pos Malaysia, the PKs are offered an additional commission of 50 sen per item to deliver Pos Laju items to their respective communities as well as other areas where their support is required.

g) From March to November 2021, the 103 PKs delivered more than 220,400 items, equivalent to an average of 237 per PK per month, or 12 items per PK per day. The POS delivered in Sabah is about 57% more than what is delivered in Sarawak during the period.

ISSUES & CHALLENGES

The following are some of the initial findings obtained from the respective licensees involved throughout the P3K rollout:

a) Size of parcels/item: PKs can only handle the small packages as most of them only have motorcycles or small cars.

b) Process: There is a need to streamline the delivery process and systems if PKs need to deliver for multiple licensees.

c) Liability: Who will be responsible for the loss of items?

d) Priority: Whose parcel is to be delivered first?

e) Volume level: Volume level depend on the areas, and this will impact the readiness of the licensees to engage the PK and, consequently, the potential earnings of the PKs.

f) Distance: Some PKs would need to travel to the licensee branch once or twice a week to collect the shipments – this can become costly for them if the volume is low.

BREAKTHROUGH AND OPPORTUNITIES

The rollout of P3K has brought into light some exciting prospects such as:

a) Lower delivery costs to rural areas for licensees as there is no need to focus on achieving economies of scale.

b) Shorten the delivery time to the rural areas which previously only happen twice a week.

c) Increase of delivery area coverage for licensees, directly contributing to more online purchases.

d) Identification of new demand growth areas for delivery volume in rural Sabah and Sarawak.

e) Leverage of digital technologies to improve the delivery tracking process by PKs.

KEY AREAS OF IMPROVEMENTS

Notwithstanding all the above, the following measures must be put into place to redress some of the shortfalls under the initial P3K rollout stage, notably the following.

POS Malaysia to play the lead role in accepting shipments from other licensees. This would allow for a smooth and seamless transition process throughout the entire delivery chain via PK. This could be achieved through an API link between POS Malaysia's and other licensees' systems. This would also enable the identification of delivery locations with enough volumes to be delivered.

SINGLE TELEVISION AUDIENCE MEASUREMENT

ENABLING SINGLE TELEVISION AUDIENCE MEASUREMENT FOR STRATEGIC MEDIA PLAN

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The growing challenge of technology evolution and transformation of television consumption habits towards diverse platforms and devices in Malaysia have led to a major upheaval in the domestic broadcasting industry in recent years. This transformation has arisen due to evolving digital technologies and growing bandwidth consumption for data transmission in this new age. Digital technologies have triggered the proliferation of numerous broadcasting services and media platforms such as digital terrestrial television, satellite television, Internet Protocol Television (IPTV), Over-the-top (OTT), Integrated Broadband Broadcast services and a variety of devices like smart TVs, android boxes, smartphones and tablets etc. The content consumption could have originated from live TV or digital on-demand through these multiple multimedia devices.

According to Nielsen Consumer and Media View from July 2020 to June 2021, the majority of Malaysians, i.e. 84%, consume both traditional and digital media in 2021. This is an increase of 5% over a year as compared to 79% in 2020. The myriad of media platforms, devices and content choices have changed Malaysian living habits and viewing preferences towards new media consumption. The increasing ownership of mobile gadgets and lower broadband service subscription fees has led to the ubiquitous phenomenon where Malaysians watch television programmes and video content interchangeably between digital media and traditional broadcasting platforms. The change of living habits and preferences towards digital media among Malaysians also resulted in the expansion of domestic broadcasting services to new media platforms to cope with the phenomenon of audience shift to digital media.

In spite of the domestic broadcasting industry and technology services evolving at a fast pace, Television Audience Measurement in Malaysia is still conducted by several market research agencies that cater for traditional broadcasting services namely Free-to-Air TV, pay TV and IPTV only. Media agencies and advertisers have to use these diverse methodologies from different sources

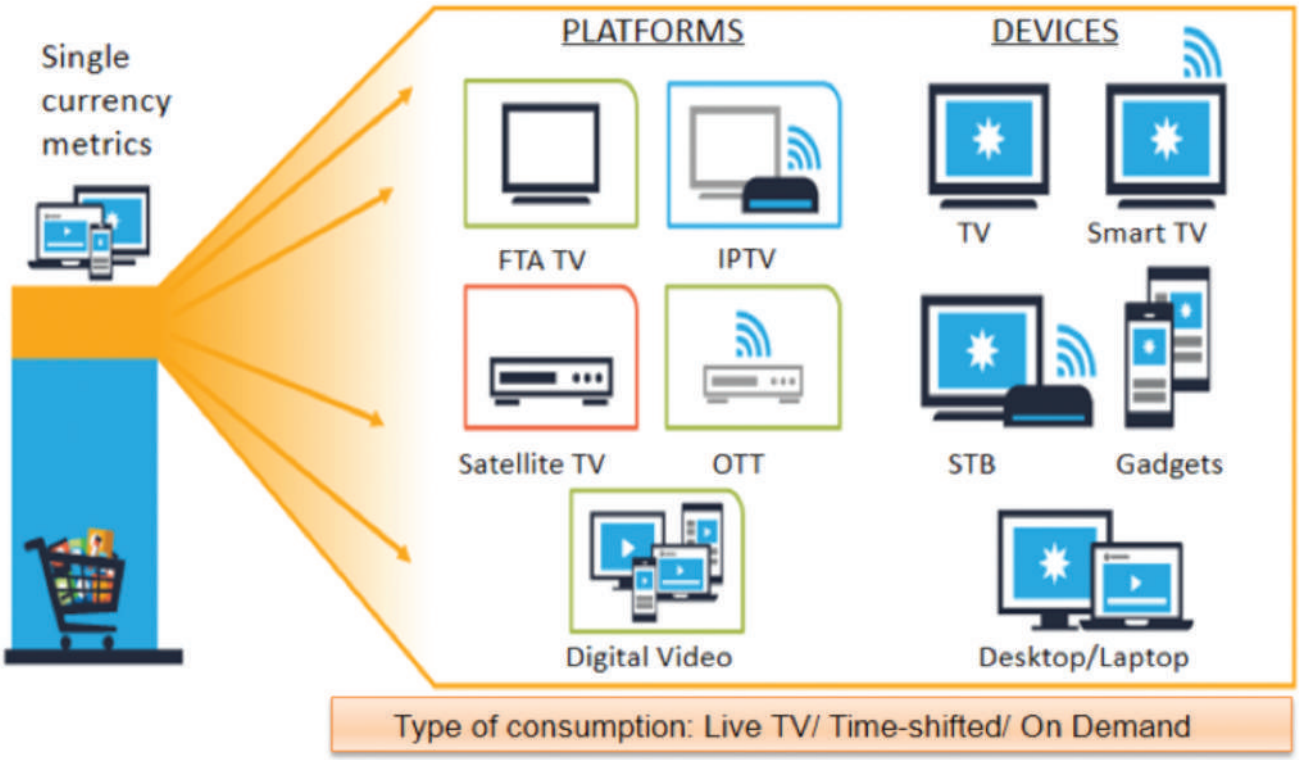

Figure 1: Types of consumption

of research companies to evaluate television audiences. Moreover, this divergence yields an incomplete picture of the total viewership, particularly in the current age of convergence with new media. These current television ratings or currency produced by existing Television Audience Measurement services are incompatible across multi-platform and exclude the viewership on digital media. The availability of television audience data from several sources has resulted in ineffective media placement and advertising campaign strategies. The fragmentation of the audience by multi-platforms has diminished the accuracy of television audience data and loss of viewership, thereby causing lower advertising revenue to the domestic broadcasting industry without taking into account new media online viewership data.

WHAT IS SINGLE TELEVISION AUDIENCE MEASUREMENT?

Single Television Audience Measurement is a single source of sociological analysis to produce statistical information representing new media and television audiences from multiple platforms and multiple devices. STAM measures

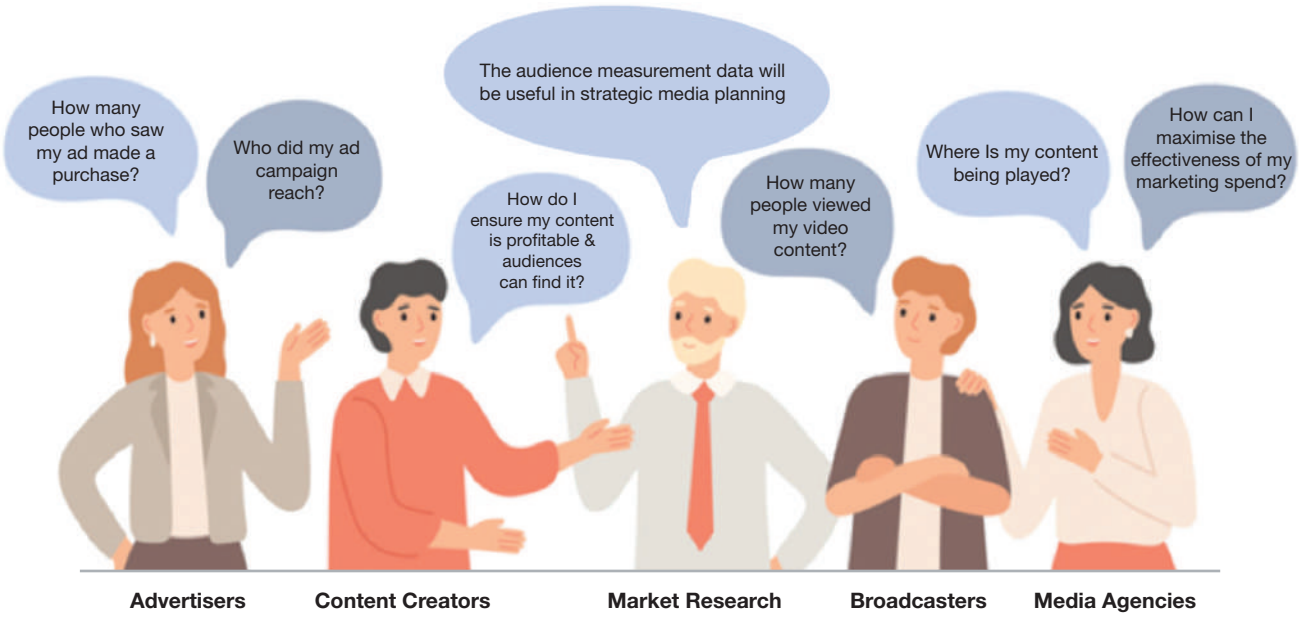

Figure 2: STAM is expected to serve the need in the broadcasting and advertising industry

the number of audience consuming a television content on multiple platforms and devices.

The industry stakeholders like broadcasters, content producers, media agencies and advertisers are interested in who are the audience and what kind of television programmes they chose. Therefore, STAM is of significant importance to the industry because the audience data can be an indicator of how well and how often audiences view a specific television programme or advertisement. Broadcasters, especially Free-To-Air TV broadcasters need a STAM that gives a unified view of what their audience are watching across all platforms and which also identifies the contribution of viewership from each broadcasting platform.

THE MOVE TOWARDS SINGLE CURRENCY GOAL FOR MALAYSIA

The consumption of video content has shifted towards online and led to the Television Audience Measurement in global markets developing quantitative research systems that take into account media consumption on new media platforms in response to fragmenting viewing behaviour patterns. A number of countries have adopted single currency audience measurement to keep pace with the trend of media convergence and paradigm shift in media viewing, such as United States, Canada, United Kingdom, France, India, Singapore, etc.

Similar to those countries, the Malaysian industry hopes to come to a consensus on a single audience measurement source that can be adopted by all stakeholders. The largest broadcasters, Astro and Media Prima TV Networks, and media agencies and advertisers had tried to bring all the related parties together in 2016 to develop an integrated methodology to measure the converging media landscape for the industry. The attempt was not successful due to a lack of consensus among the stakeholders. Subsequently, the domestic broadcasters have sought support from MCMC in expediting the development towards a credible single currency for television audience measurement.

In line with the global trend of audience measurement development and broadcast technology evolution, MCMC has taken the initiative to collaborate with broadcasters and advertising agencies to establish STAM for the broadcasting industry under the STAM Working Group since December 2019. The STAM Working Group comprises industry stakeholders namely broadcasters from multiple platforms, Malaysian Advertisers Association (MAA), Media Specialist Association Malaysia (MSA), Malaysia Digital Association (MDA) and Association of Accredited Advertising Agents (4As). The STAM Working Group members have agreed that STAM should be developed and spearheaded by MCMC as a single currency covering multiple platforms and multiple devices to facilitate media buying and to enhance advertising revenue. The unified audience measurement results will be used with industry consensus as a single currency for advertising rate card trading in the television broadcasting industry.

PREPARATORY WORK FOR SINGLE CURRENCY INITIATIVE

MCMC has conducted a Request For Information (RFI) to solicit input from international practices worldwide to attain more information on STAM rollout. MCMC issued 10 invitations to research companies that have similar experience in STAM implementation and successfully received 7 responses from incumbent domestic and foreign audience measurement service providers. The outcome of the RFI has provided information and technological solutions, general practices in global market and strategical approaches for the preparatory work of framework development and preliminary specifications for STAM.

The STAM working group has prepared preliminary specifications for STAM implementation and proposed that a consultant be appointed to ensure a successful roll out of STAM. MCMC subsequently appointed RSquared Global Ventures Pte. Ltd. through tender process selection to provide consultancy services for STAM implementation in Malaysia taking into account their over 20 years' experience in the television audience measurement field and their credentials in the audience measurement field in global markets including Azerbaijan, Czech Republic, Finland, Serbia and Netherlands. The Consultants further reviewed and enhanced the preliminary specifications and subsequently engaged with the STAM Working Group to address all concerns and secure feedback from all the stakeholders to finalise the tender specifications.

MCMC is conducting an open tender in Quarter 3 of 2022 to request proposals to design, build, supply, install, commission, operate and maintain the STAM services in Malaysia. STAM services are expected to be self-sustainable in future upon collection of subscription fees from the industry stakeholders once STAM data is made available for subscription.

DELIVERY OF SINGLE TELEVISION AUDIENCE MEASUREMENT

STAM is typically composed of two inter-related elements: establishment survey and viewing panel. Establishment Survey is census-type measurement used to provide aggregate data from entire universes of audience for the selection of robust sampling elements among the panel respondents across multiple platforms and devices. However, census-type data is not obtained from a real census of all possible audience or subscribers to television services. The data is obtained from only a very large subset that is representative of the entire universe.

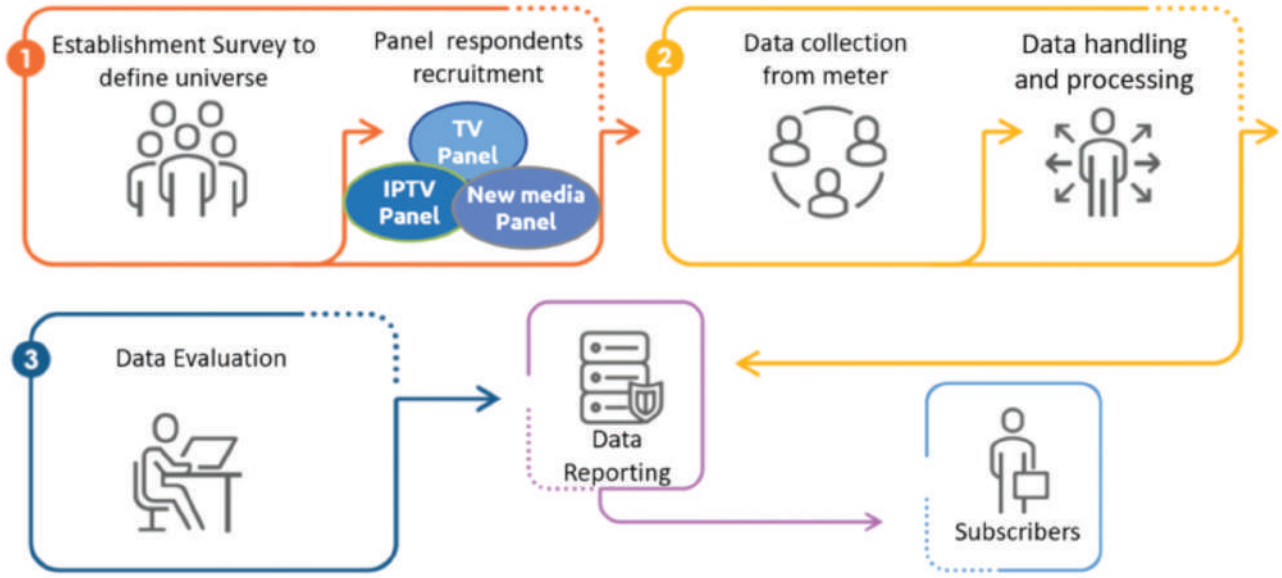

Figure 3: Single Television Audience Measurement Model

Panel respondents will be recruited by a market research agency to provide data for the calculation of television ratings. The panel respondents are preselected samples that are representative of the population universe that have agreed to participate in research. They are incentivised to provide demographic profile and viewership data.

Special metering equipment such as peoplemeter, Return Path Data (RPD) and Software Development Kit (SDK), etc. are installed by the market research agency to capture daily television viewing activities under continuous surveillance. The data is captured electronically from recruited sampling households second per second every day and all year long. The metering equipment captures two important measurement ingredients, what is being watched and who is watching.

The data collection from panel homes and multiple devices is cleansed and mapped to demographics and television programmes or advertisements for ratings computations. The traditional television ratings and digital content ratings are combined to produce total ratings number for the complex and fragmented content from multiple platforms and devices. The processed data is evaluated to produce comprehensive and unduplicated television audience data. All the practitioners in the broadcasting and advertising industry will use a single data reporting tool to process the television audience data according to their respective business needs and decisions.

ADOPTION OF STAM TO ENABLE EFFECTIVE MEDIA PLANNING

STAM should resolve the dilemma of divergence in television audience measurement methodologies from different market research agencies. The data gathered through audience measurement is very important and extremely valuable. The television audience data serves as the single official currency for television advertising market to facilitate the buying and selling activities for commercial airtime in television markets. Besides, broadcasters are able to understand their target audiences using television audience data in order to offer the most compelling content to their audiences. The measurement results also provide deep insights into audience preferences to assist the broadcasters in production or acquisition of popular content for their audiences. Broadcasters can increase profits by planning their programmes and scheduling via content acquisition or production based on the audience tastes and viewing time preferences. Broadcasters can maximise profits by knowing the peak hours of a day at which the highest number of people watch television and online. They can then charge commercial airtime according to the number of people and targeted audience based on demographic data from STAM. The STAM is expected to be used by broadcasters and advertisers to negotiate and trade the hourly rate of advertising time slot on television broadcasting services.

A credible currency shall be produced to enhance the confidence level among media agencies and advertisers for ease of cross-media planning in domestic television and multimedia markets. Reliable and accurate television audience data is fundamental for the television market. Advertisers and media agencies obtain television audience data and maximise their return on investments by coming up with advertising plans that target their potential customers. This is done by making sure that their content is shown at the right time to the right target audience.

In addition, content creators gain insight into viewer preferences to plan their approach and produce television

Figure 4: Adoption of STAM in the multimedia industry

content that is tailored to the audience's tastes. Audiences will be able to have their preferences heard and they can look forward to better quality and more engaging content.

STAM is expected to enable the broadcasters, media agencies and advertisers to make efficient investments and devise effective media plans from television programming and scheduling for targeted ad sales based on unified and comprehensive audience measurement result. Awesome measurement results inspire better programming and scheduling, rewarding the broadcasting industry with more viewers and higher advertising revenues. STAM is also expected to stimulate the development of more quality and engaging local content and spur the growth of viewership and advertising revenues in the near future. .my

CASE EXAMPLE

APPRAISING THE APPLICATION OF SECTION 206(3) OF THE COMMUNICATIONS AND MULTIMEDIA ACT 1998

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The Malaysian Communications and Multimedia Commission (MCMC) was established with powers to supervise and regulate the communications and multimedia activities in Malaysia, and to enforce the communications and multimedia laws of Malaysia. This also includes the broadcasting sector. MCMC fulfils its charge by ensuring it undertakes enforcement activities including investigating the activities of a licensee or other person material in accordance with the Communications and Multimedia Act 1998 (CMA 1998) or its subsidiary legislation. The case examined in this article concerns the non-compliance of the Content Applications Services Provider Individual Licence [CASP(I)] holder with the license conditions.

FACTS OF THE CASE

The Enforcement Division, MCMC received a complaint against Measat Broadcast Network Systems Sdn. Bhd. over the local comedy sketch talk show "Rumah No. 107," which was broadcast on ASTRO Warna. The complaint involved a claim of non-compliance with the Malaysian Communications and Multimedia Content Code due to obscene content, violence, and bad language in the said talk show from minutes 17:17 to 19:16. An investigation was initiated for failure to comply with section 206(3) of the CMA 1998.

FINDINGS OF THE INVESTIGATION

The investigation was initiated to determine if Measat Broadcast Network Systems Sdn. Bhd., as a Content Applications Service Provider Individual Licence [CASP(I)] holder, was compliant with the licence condition. Section 206(3) stipulates:

> **206. Compliance with licence conditions**
>
> **(3)** A content applications service provider shall not provide any service except in accordance with the conditions of the licence granted to that licensee under this Chapter or the conditions of a class licence to which such content applications service provider is subject.

This section requires the CASP holder, which in this case is Measat Broadcast Network Systems Sdn. Bhd. to adhere to all the conditions prescribed in the licence. Among the conditions is paragraph 6.1 of Part A, which states as follows:

> 6.1 The licensee shall comply with any consumer codes and content codes registered under the Act which are relevant to the activities of the licensee.

The relevant content code in this matter is the Malaysian Communications and Multimedia Content Code (Content Code). It provides guidelines and procedures for good practice and standards of content disseminated to audiences by service providers in the communications and multimedia industry in Malaysia.

The talk show that was alleged to contain obscenities, violence, and bad language was broadcast twice on channel 107 ASTRO Warna on 18 June 2021 at about 9.00 pm and on 23 June 2021 at around 9.00 pm. There was a scene where the hosts asked the guest actor about his experience playing the antagonist whose character commits robbery and rape. In sharing his experience, the guest actor made statements that contained explicit sex acts/pornography, sexual degradation, violence, offensive language, and crude references.

To determine whether there was a violation of paragraph 6.1 of the CASP standard licence conditions, MCMC sought the opinion of the Communications and Multimedia Content Forum of Malaysia (CMCF). CMCF subsequently submitted an Advisory Order to MCMC verifying that the content broadcast in the programme was against the Content Code.

To ensure a thorough investigation, several personnel from Measat Broadcast Network Systems Sdn. Bhd. were interviewed and it was revealed that no editing had been done by the editor after obtaining the contents of the recorded video on 17 June 2021 at approximately 11 pm.

PROOF OF VIOLATION OF SECTION 206(3) OF THE CMA 1998

The investigation found that Measat Broadcast Network Systems Sdn. Bhd. had breached section 206(3) of the CMA 1998 by failing to comply with several paragraphs in Part 2 and Part 4 of the Content Code.

Part 2 of the Content Code essentially explains the content guidelines. It does not merely provide examples of controversial contents, but also provides guidelines on how to deal with them. In the case of obscene content, the Content Code provides that any portrayal of sexual activity that a reasonable adult considers explicit and pornographic is prohibited. The portrayal of sex crimes, including rape, attempted rape, and statutory rape, as well as bestiality is not permitted, including the portrayal of such sexual acts through animation, whether consensual or otherwise. Meanwhile, concerning sexual degradation, the Content Code provides that the portrayal of women, men, or children as mere sexual objects or to demean them in such manner is prohibited.

The evidence gathered for this case included the statements made by the guest actor between minutes 17:58 and 18:25 about the rape scene and how the scene was played by the guest actor. On analysis of the said statement, it was found that Measat Broadcast Network Systems Sdn. Bhd. had violated paragraph 3.1(i) of the Content Code by broadcasting the programme contained therein in which the guest actor narrated the details of the rape scene. In relation to paragraph 3.1(iii) of the Content Code, the words of the guest actor degraded the woman involved in the rape scene by detailing the woman's dress and position during the rape scene. Moreover, any matter that relates to violent sexual behaviour, especially rape, is offensive to women, as well as men.

On the issue of violence, the relevant guidelines are explained under paragraph 4.0 of the Content Code. In principle, violence or incitement to violence should be portrayed responsibly and not exploitatively. Presentation of violence must avoid being excessive, gratuitous, humiliating, and instructional. The term violence is divided into several categories in the Content Code, which are 4.3(i) offensive violence, 4.3(ii) imitable violence, 4.3(iii) sexual violence, and 4.3(iv) violence involving young, vulnerable audiences. Specifically on sexual violence, paragraph 4.3(iii) provides that graphic representations of sexual violence, such as rape or attempted rape or other non-consensual sex, or violent sexual behaviour are not allowed. The facts of this case show that the content involves violence from minute 17:43 to 17:58, where it was portrayed that playing a character who commits robbery and rape brought satisfaction to the guest actor.

Paragraph 6.0 of the Content Code covers the use of bad language, as follows: Paragraph 6.1(i) offensive language, 6.1(ii) crude references, 6.1(iii) hate speech, and 6.1(iv) violence. The use of disparaging or abusive words which are calculated to offend an individual or a group of persons is not permitted. As for crude references, paragraph 6.1(ii) indicates that words in any language commonly used in Malaysia which are considered obscene or profane are prohibited, including crude references to sexual intercourse and sexual organs. It is, however, permissible to use such words in the context of their ordinary meaning and not when intended as crude language. Based on the analysis of the content, it was found that there were dialogues that contained elements of sexual violence and use of bad language which made the audience uncomfortable.

Part 4 of the Content Code explains the guidelines on specific broadcasting. The objective of these specific broadcast guidelines is to ensure continued reliable standards of content disseminated by broadcasters in accordance with expectations of audiences and internationally recognised good practices of electronic media and journalism. Among other things discussed is the use of violence and bad language in paragraph 3.12. It basically explains the general guidelines on violence and bad language set out in Part 2 of the Content Code. Among the things that should be considered by broadcasters are as follows:

- Exercise appropriate editorial judgment in the reporting of audio and visual representation of violence, aggression or destruction within their content.
- Exercise caution and appropriate discretion in the selection of and repetition of content which depicts violence.
- Exercise appropriate discretion in the use of explicit or graphic language related to stories of destruction, accidents or sexual violence, which could be disturbing for family viewing.

Based on the analysis of the broadcast of this "Rumah No. 107" programme, it was found that Measat Broadcast Network Systems Sdn. Bhd., as a broadcaster, had failed to carry out proper editing of audio and video material and failed to exercise appropriate discretion in the use of explicit language in the broadcast/reported content dealing with sexual violence. This finding is strengthened by the fact that no edits were made before the content was broadcasted.

CONCLUSION

With the consent in writing of the Public Prosecutor, Measat Broadcast Network Systems Sdn. Bhd. was compounded RM50,000.00 for contravening section 206(3) of the CMA 1998.

SCOREBOARD

Postal and Courier

POSTAL TRAFFIC DOMESTIC PARCELS

MILLION

2021 : 0.8
2020 : 0.8
2019 : 0.9
2018 : 0.9
2017 : 1.0
2016 : 0.9
2015 : 0.8

POSTAL TRAFFIC DOMESTIC LETTERS

MILLION

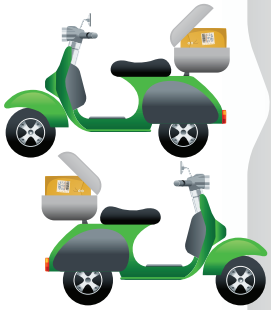
2021 : 365.0
2020 : 456.9
2019 : 596.5
2018 : 672.3
2017 : 738.1
2016 : 808.2
2015 : 851.3

NUMBER OF POST OFFICES

2021 : 788
2020 : 810
2019 : 896
2018 : 914
2017 : 921
2016 : 927
2015 : 930

COURIER TRAFFIC DOMESTIC DOCUMENTS

MILLION



2021 : 94.6
2020 : 107.3
2019 : 91.6
2018 : 87.3
2017 : 52.8
2016 : 47.2
2015 : 33.2

NUMBER OF COURIER LICENCES

2021 : 122
2020 : 106
2019 : 104
2018 : 119
2017 : 128
2016 : 112
2015 : 88

COURIER TRAFFIC DOMESTIC PARCELS

2021 : 623.2
2020 : 303.2
2019 : 120.3
2018 : 85.7
2017 : 34.3
2016 : 23.7
2015 : 18.6

Communications and Multimedia

PENETRATION RATES: MOBILE - CELLULAR PER 100 INHABITANTS

2021 : 142.1%
2020 : 133.6%
2019 : 135.4%
2018 : 130.2%
2017 : 131.2%
2016 : 139.9%
2015 : 143.8%

PENETRATION RATES: MOBILE-BROADBAND PER 100 INHABITANTS

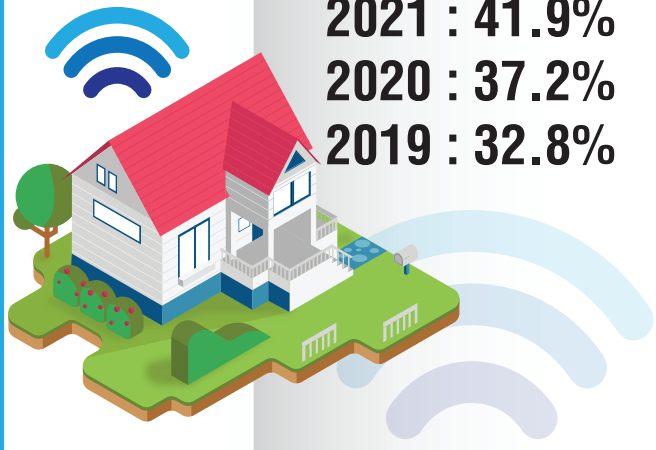
2021 : 124.1%
2020 : 118.7%
2019 : 123.7%

PENETRATION RATES: PAY TV PER 100 HOUSEHOLDS

BILLION

2021 : 80.0%
2020 : 83.4%
2019 : 86.3%
2018 : 87.6%
2017 : 83.6%
2016 : 78.6%
2015 : 73.7%

PENETRATION RATES: FIXED BROADBAND PER 100 PREMISES



2021 : 41.9%
2020 : 37.2%
2019 : 32.8%

Note: Fixed-broadband penetration rate is calculated based on fixed-broadband subscriptions with speed equal to or more than 1 Mbit/s.

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