OUTLOOK 2023

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WASD WORLD ASSOCIATION FOR SUSTAINABLE DEVELOPMENT

REVIEW

THE RELEVANCE OF ARTIFICIAL INTELLIGENCE IN MITIGATING SOCIO-ECONOMIC IMPACTS OF COVID-19 AND FUTURE EPIDEMICS

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CITATION: Ramanathan, S., Tang, S.G.H., Afzal, M.M., Ker, P.J., Krishnan, P.S., Chen, C.P., Tiong, S.K. and Yaw, M.W. (2023) "The Relevance of Artificial Intelligence in Mitigating Socio-economic Impacts of COVID-19 and Future Epidemics", in *World Sustainable Development Outlook 2023*, Vol. 19, pp. 105–122 (London, UK: WASD).

RECEIVED: 5 September 2023 / **REVISED:** 25 October 2023 / **ACCEPTED:** 25 October 2023 / **PUBLISHED:** 30 December 2023

DOI: 10.47556/B.OUTLOOK2023.19.7

ABSTRACT

PURPOSE: The purpose of this paper is to explore the latest publications on an AI application and present a systematic review of its impact in diverse sectors, particularly in mitigating COVID-19. Even though the relevance of AI in mitigating the COVID-19 outbreak has gained much attention among researchers, one of the fundamental concerns that needs to be addressed is whether the public's understanding of AI's relevance will endure and strengthen in order to combat future pandemics. In the case of a developing nation, like Malaysia, what is the level of AI intervention and how compatible it is in handling the current scenario and future epidemics? Finding answers for these questions is crucial, as it would push Malaysia into great efforts towards massive and effective use of digital technology, particularly AI adoption, that will eventually help the country to achieve the UN's 2030 Sustainable Development Goals. In this regard, this paper aims to cover specifically the digital and AI transformation in Malaysia, followed by the relevance of AI in mitigating the socio-economic impacts of pandemics and future epidemics.

METHODOLOGY: This paper is primarily a review paper, used a systematic literature review and content analysis approach to find the role of AI application and tools in diverse sectors, including its breakthrough during the recent pandemic. This study conducted a comprehensive search across multiple databases using keywords such as artificial intelligence, digital transformation, COVID-19, pandemic and impacts.

FINDINGS: Based on a comprehensive review process, this paper integrates various scopes of AI's roles and relevance, from various perspectives to a narrow scope of pandemic and future epidemic perspective. Upon highlighting the continuous efforts for technological and digital transformation as well as the emerging state of AI in Malaysia, this paper emphasises the relevance of AI in mitigating the socio-economic impacts of pandemics in the context of healthcare, employment and income, and education. The final part covers a brief description of the core challenges concerning technology adoption in general and in expediting AI for future states in Malaysia.

ORIGINALITY: This paper presents an overview of AI's roles and relevance in various aspects and contexts. Despite a wide range of previous reviews on the role of AI in mitigating the spread of COVID-19, this study focuses on how AI mitigates the socio-economic impacts, by integrating the emerging trends and potentials of AI.

IMPLICATIONS: The impact of the previous economic crises and the recent pandemic have clearly shown the gaps and potentials for Malaysia to move forward and gain momentum to achieve a balanced economic growth. Technological advancement with AI innovations is indeed an essential requirement for Malaysia to have such economic growth. Therefore, the significance of this study is in portraying the relevance of AI in tackling the impact of pandemics in a socio-economic context. It may contribute ideas for future research to be done empirically.

KEYWORDS: *Artificial Intelligence; Digital, Socio-Economic; COVID-19; Pandemic; Malaysia*

BACKGROUND

Global communities have long been experiencing technological revolution and transformation. The 21st century shows evidence of progressive and aggressive movement towards the digital economy. Various technological drivers, such as Artificial Intelligence (AI), Big Data Analytics, Cloud Computing, Cybersecurity, Internet of Things (IOT), Machine Learning and several others, are emerging in the process of digitalisation of production-based industries worldwide. In this juncture, digital adoption and the effective use of digital technology across the globe has become a prominent challenge in building sustainable industries, cities, and communities. Therefore, in the current era of globalisation and IR 4.0, the importance of technological advancement in every aspect of human life has been brought into the limelight through extensive research, innovation, and applications. This includes a huge discovery of AI tools, its capabilities and immense use in human life.

AI's tools and capabilities in advancing numerous disciplines and industries are remarkable (Table 1). McKinsey's 2022 Global Survey on AI adoption shows that the level

of investment in AI has increased alongside its rising adoption of AI, which has doubled since 2017. McKinsey's findings exhibit substantial room for improvement in terms of the diversity of AI.

Table 1: Summary of Literature on AI Application and its Impact in Diverse Sectors

Disciplines	Application/Impact	Author
Agriculture	Increasing farming efficiency, improving crop quality, minimising negative environmental impacts	Mohammad (2020) Talaviya *et al*. (2020) Javaid *et al*. (2023)
Manufacturing	Leading to concepts like intelligent manufacturing, smart factories, smart manufacturing	Yang *et al*. (2021) Kehayov *et al*. (2022) De Simone *et al*. (2023)
Aviation	Airplane simulators use AI to process information. Helps support employees, improving efficiency and overall product quality	Kashyap (2019) Mohammad (2020)
Education	Technically feasible and positively supports learner-instructor interaction	Seo *et al*. (2021) Zhang and Aslan (2021) Zhai *et al*. (2021)
Healthcare	Benefits the medical community and patients. Improve diagnostics, prevention, and treatment of patients, increase efficiency of health service management	Chen and Decary (2020) Sunarti *et al*. (2021) Ali *et al*. (2023)
Business	Increase in productivity, time and cost efficiency, customer preference projection, and sales expansion	Palanivelu and Vasanthi (2020) Soni *et al*. (2020) Perifanis and Kitsios (2023)

Source: Constructed by authors

AI's breakthrough has emerged significantly during the recent COVID-19 pandemic. Although this technology driver is already being applied for a wide range of healthcare services and procedures, such as diagnosis and treatment of medical conditions and medical imaging, there is an abundance of publications in the form of reports and articles that reviewed the new insights of AI in mitigating the COVID-19 outbreak (Table 2).

Table 2: Summary of Selected Literature on AI Application in Mitigating the COVID-19 Pandemic

	Title (Author)	Scope and Relevance
1	Applications of Artificial Intelligence in Battling Against Covid-19: A Literature Review (Tayarani, 2021)	Performed an overview on the applications of AI in a variety of fields and a comprehensive survey on the applications of AI in battling against the impact of the pandemic.
2	Artificial Intelligence and COVID-19: A Multidisciplinary Approach (Ahuja *et al*., 2020)	Explained the relevance of AI in combating the pandemic through AI innovation in four key areas: drug discovery, vaccine development, public communications, and integrative medicine.

(continued)

Table 2: Summary of Selected Literature on AI Application in Mitigating the COVID-19 Pandemic *(continued)*

	Title (Author)	Scope and Relevance
3	Artificial Intelligence (AI) applications for COVID-19 pandemic (Vaishya *et al*., 2020)	Conducted a rapid review of the literature, collected the latest information regarding AI for COVID-19 and identified seven significant applications of AI for COVID-19 pandemic.
4	Artificial intelligence and COVID-19: Present state and future vision (Chang, 2020)	Presented the global health concepts to recognise the underlying forces of a pandemic with relevance to AI, covered various aspects of diagnosis and therapy with regards to AI and provided future projections of an ideal deployment of artificial intelligence in a pandemic.
5	Artificial intelligence in COVID-19 drug repurposing (Zhou *et al*., 2020)	Provided a strong rationale for using AI-based assistive tools for drug repurposing medications for human disease, including during the COVID-19 pandemic.
6	Applications of Artificial Intelligence in COVID-19 Pandemic: A Comprehensive Review (Khan *et al*., 2021)	Critically reviewed and summarised the recent research, development and advances in the area of AI-based technologies for combating the COVID-19 pandemic.
7	The Role of Artificial Intelligence in Fighting the COVID-19 Pandemic (Piccialli *et al*., 2021)	Analysed and discussed the capabilities of AI in supporting people and life during the pandemic based on five-time stages, explored the experiences, limitations, trends and directions of AI.
8	Artificial Intelligence and a Pandemic: an Analysis of the Potential Uses and Drawbacks (Williams *et al*., 2021)	Reviewed and discussed the advantages and disadvantages or limitations of AI that potentially impact the society in a pandemic setting.
9	AI in Fighting Covid-19: Pandemic Management (Tripathi *et al*., 2021)	Conducted literature review to comprehend the current state of pandemic management and the benefit of utilising AI capabilities.
10	COVID-19 pandemic and artificial intelligence possibilities: A healthcare perspective (Gupta and Lall, 2021)	Discussed and exposed the role of AI and ML from healthcare perspectives and in pandemic context.
11	Artificial Intelligence and COVID-19: A Systematic umbrella review and roads ahead (Adadi *et al*., 2022)	Conducted a constructive systematic review of the reviews studying AI applications against COVID-19 and found seven key themes of research that may be an outcome of the present crisis. The results predicted that the next AI generation will show some of efficiency, sustainability, openness, autonomy, creativity, responsibility, precision and personalisation.
12	Artificial intelligence and COVID-19: fighting pandemics (Aydinoglu and Kushchu, 2022).	Presented phase-based analysis by providing the ways AI could be used in fighting COVID-19 and some key initiatives based on reviews of various sources.
13	Artificial intelligence-based solutions for COVID-19 (Pawar *et al*., 2022)	Discussed the possible contributions of AI in six areas, in present and future contexts, such as, alerts and early warnings, tracking and prediction, dashboards with info, diagnosis and prognosis, medication and cures, social distancing.

(continued)

Table 2: Summary of Selected Literature on AI Application in Mitigating the COVID-19 Pandemic *(continued)*

	Title (Author)	Scope and Relevance
14	AI-enhanced solutions during COVID-19: Current trends and future innovations (Nawaz *et al*., 2022)	Described the contributions of AI during COVID-19 by highlighting the trends and innovations in this domain towards sustainable healthcare solutions.
15	Review on the COVID-19 pandemic prevention and control system based on AI (Yi *et al*., 2022)	Systematically surveyed and summarised the applications of AI during the pandemic and the challenges faced during the AI-based pandemic prevention process.

Source: Constructed by authors

In addition to this literature that has discovered the relevance of AI towards the COVID-19 pandemic, an Organisation for Economic Co-operation and Development (OECD) (2020) report demonstrated consistent facts, model and key messages on how employing AI tools and technologies can support efforts at four different stages of the crisis, detection, prevention, response, recovery, and to accelerate research. The report also stressed that an effective use of AI tools can help in monitoring the economic crisis and recovery.

Even though the relevance of AI in mitigating the COVID-19 outbreak has gained much attention among researchers, medical community, intergovernmental organisations and policy-makers, there are concerns that need to be addressed. One of the fundamental concerns is whether the public's understanding of AI's relevance will endure and strengthen in order to combat future pandemics. In the case of a developing nation, like Malaysia, what is the level of AI intervention and how compatible it is in handling the current scenario and future epidemics? Finding answers for these questions is crucial, as it would push Malaysia into great efforts towards massive and effective use of digital technology, particularly AI adoption.

DIGITAL TRANSFORMATION AND ARTIFICIAL INTELLIGENCE IN MALAYSIA

The telecommunication sector in Malaysia has undergone significant structural transformation since independence. In the past few decades, it has transformed from a sector regulated completely by public entities to a liberalised industry with many competitive private players (Sivalingam, 2010). Table 3 shows the chronology of Malaysia's movement towards a knowledge-based economy while leveraging information and communication technology (ICT).

Malaysia's continuous efforts for technological and digital transformation indicated the country's relevance towards digitalisation and digital economy. In 2019, Malaysia's ICT gained RM289 billion (US$60,618,790,400), accounting for 19.1% of GDP (Economic Planning Unit, 2020). In 2020, the COVID-19 pandemic accelerated the process of

Table 3: Chronology of Malaysia's Movement Towards K-Economy and ICT

Year	Initiatives
1996	Malaysia Digital Economy Corporation (MDEC) was established to advise the government on ICT and multimedia development.
1998	Malaysia launched a new regulatory model comprising Communications and Multimedia Act 1998 and the Malaysian Communications and Multimedia Commission Act 1998 under Malaysian Communications and Multimedia Commission (MCMC). MCMC serves to implement and promote the government's national policy objectives for the communications and multimedia sectors.
2008-2010	The National Broadband Initiative was introduced as the backbone for connectivity in accelerating internet usage in Malaysia.
2013	The National Policy on Science, Technology and Innovation was launched to advance mainstream science, technology and innovation.
2014	The National eCommerce Strategic Roadmap.
2015	Public Sector Big Data Analytics Project.
2016	Public Sector ICT Strategic Plan introduced to implement data analysis to gain insights and enhance public service delivery.
2017	Malaysia Productivity Blueprint to strengthen digitalisation among micro, small and medium enterprises (MSMEs) through eCommerce and innovative technology adoption; Digital Free Trade Zone was also launched to facilitate cross-border eCommerce and widen global market access for MSMEs.
2018-2019	The government established the National 5G Task Force and the NFCP to enhance digital infrastructure and accelerate digital economy transformation.
2019	Public Sector Modernisation and Digitisation Committee was formed as a governance mechanism for the implementation and monitoring of digitalisation initiatives.

Source: Adapted from Malaysian Digital Economy Blueprint, Economic Planning Unit, 2020; Malaysian Communications and Multimedia Commission, 2017

digitalisation by flipping almost all economic activities from physical to virtual. Consequently, Malaysia set up the National Digital Economy and 4IR Council to accelerate local capabilities in embracing digitalisation, followed by the Malaysia Digital Economy Blueprint to drive Malaysia towards a digital economy.

According to the AI roadmap (MOSTI, 2021), the Government AI Readiness Index 2020 shows Malaysia ranked at 28th globally and 1st regionally. In the efforts to discover how Malaysia is embracing AI, a study conducted in 2018 by the International Data Corporation (IDC) involving 100 business leaders and 100 workers in Malaysia, concluded that business leaders in Malaysia require a mindset change to embrace a new culture where innovation and continuous learning are core components of the organisational culture. In 2021, the Malaysian Artificial Intelligence (AI) Roadmap Survey complemented the above survey in exposing the state of AI use and development in Malaysia. This 2021 survey revealed that AI governance initiatives as well as the AI infrastructure and data activities in Malaysia are mostly at the initial stage with a huge requirement for AI related expertise and for AI innovation cum R&D. Although AI adoption is at an emerging stage, many organisations in

Malaysia have begun several AI initiatives at various levels. For instance, the government agency Malaysian Investment Development Authority (MIDA) promotes AI among SMEs; Malaysian Universities having AI academic programmes, AI centre for excellence, AI related research and collaboration; a total of more than 100 international companies and digital start-ups in Malaysia have already engaged with AI. Petronas, Microsoft (Malaysia) Sdn Bhd, Telekom Malaysia Berhad and Huawei are among the big companies, actively initiating various AI projects and programmes in Malaysia.

COVID-19 PANDEMIC SCENARIOS IN MALAYSIA

In 2020, the World Health Organization (WHO) declared the novel coronavirus outbreak as a global pandemic on 11 March. Malaysia has gone through three major waves of COVID-19 outbreaks: the first wave of infection started on 24 January 2020, with the identification of 22 cases, followed by a second wave that began on 27 February 2020 (WHO, 2020a), and a third wave started in September 2020 (Aw *et al*., 2021). Malaysia recorded a total of 5,532 confirmed cases and 93 deaths in April 2020. By the end 2020, the total confirmed cases reached 105,096 (WHO, 2020b). As of 28 March 2021, Malaysia has recorded 1,255 deaths out of 341,944 confirmed cases of COVID-19 in Malaysia (WHO, 2021; WHO, n.d.). Figure 1 shows the confirmed cases of COVID-19 in Malaysia from first wave to second wave to December 2021.

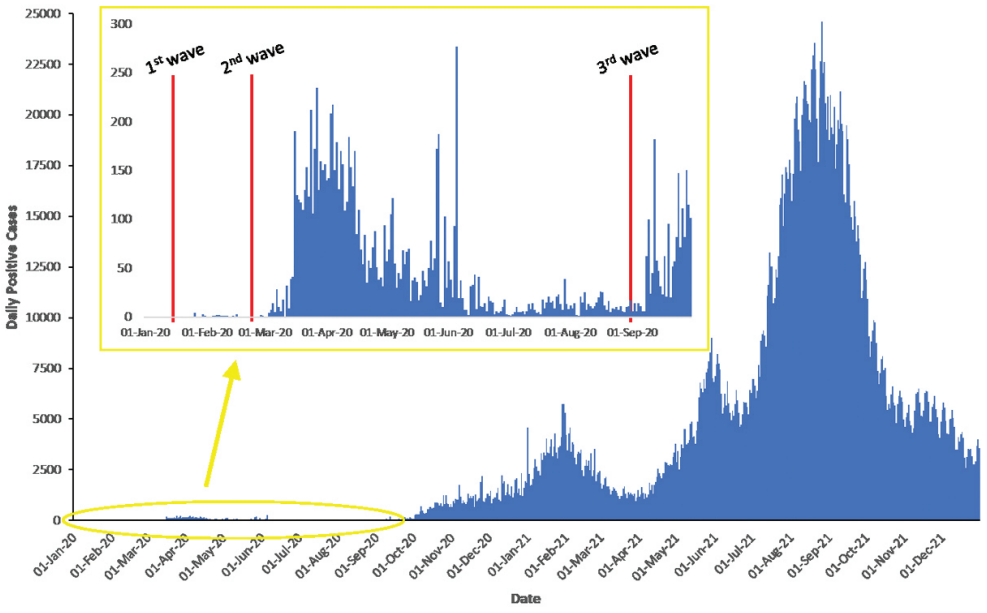

Figure 1: Confirmed Cases of COVID-19 in Malaysia, 2020-2021
Source: WHO, 2021

Malaysia has implemented multiple measures to contain the COVID-19 pandemic since January 2020. The measures started with entry restriction of foreigners in Malaysia, followed by self-quarantine of locals and foreigners returning from abroad. Subsequently, the government announced a nationwide Movement Control Order (MCO) on 18 March 2020. The government's strict execution and public responses towards the impacts of COVID-19 helped the country in overcoming the pandemic at the beginning stages (Tang, 2020; Shah *et al*., 2020; Hashim *et al*., 2021). However, Malaysia had to continue with this MCO strategy with different phases and SOPs based on the occurrence of COVID cases by location and clusters. The Movement Control Order (MCO 1.0) was followed by the Conditional Movement Control Order (CMCO), Recovery Movement Control Order (RMCO), Movement Control Order 2.0 (MCO 2.0), Full Movement Control Order (FMCO), Enhanced Movement Control Order (EMCO) and lastly the National Recovery Plan.

Since the pandemic affected various economic sectors and the socio-economic status of vulnerable groups in Malaysia, the government started focusing on the most important aspects of survival, such as monetary and non-monetary assistance, vaccination programmes, and in managing a wide range of economic activities to move on virtually. This was a crucial period, highly favoured by digital platforms. Online purchasing, online education, online banking, work from home, gained full speed. Digital tools and applications were utilised in all possible activities, particularly in medical and COVID-19 mitigating efforts. AI was one of the technological drivers that played a vital role in mitigating the impact of COVID-19.

THE RELEVANCE OF AI TOWARDS SOCIO-ECONOMIC IMPACTS OF THE PANDEMIC

In the context of AI and its role in mitigating socio-economic impacts of COVID-19, there is huge potential for AI towards enabling the affected vulnerable groups, and in enhancing productivity and generating revenue (Poniman, 2020). The socio-economic impacts of COVID-19 in Malaysia can be seen from various aspects and perspectives (Lim, 2020; Think City, 2020). COVID-19 caused a severe crash on overall economic growth compared to what Malaysia faced during previous financial crises in the late 1990s and 2008 respectively. The economic turbulence brought by this pandemic impacted households severely in terms of their healthcare, employment activities and income, educational activities, work mobility and interaction, daily life and cultural activities.

Based on the impact on healthcare, the elderly and B40 group seems to be more vulnerable than others. In general, B40 households, who mostly live in high density housing, have poor health condition, low literacy rate and face food insecurity, putting them at greater risk (Think City, 2020). COVID-19 created a huge challenge for the government in handling and co-ordinating the issues of people getting access to health clinics, doctors, medicines, PPE, health guidelines and information on COVID-19, and vaccination. However, both the general population and the government benefited from the Malaysian government's efforts aimed at optimising the applications of digital technology in mitigating the COVID-19

infection (Mohd Arif and Choo Ta, 2022). Mohd Arif and Choo Ta attempted to prove some of Malaysia's success stories of using digital applications that were helpful in controlling and monitoring COVID-19 cases. DoctorOncall, Gerak Malaysia, MySejahtera and MyTrace are among the applications that were developed and used during pandemic in 2020.

Huawei Malaysia collaborated with the Malaysia Ministry of Health to contribute Huawei Cloud AI-assisted Diagnosis solutions to Sungai Buloh Hospital to empower local medical personnel with AI capabilities by providing an AI solution for CT image analysis of possible COVID-19 patients. The Huawei Cloud AI-assisted Diagnosis solution will lead Malaysia towards innovative technologies in medical services within government hospitals across Malaysia. This technology aims to contribute greater value to the industry and drives the nation towards the digital economy (BioSpectrum, 2020).

In harnessing AI capabilities, Malaysia has placed medical and healthcare as one of the national priority areas. The AI roadmap (MOSTI, 2021) has highlighted four national AI use cases with respective objectives. First, Autonomous Vaccine Distribution and Management System with the objective of enhancing the operational efficiency of COVID-19 vaccine distribution, and to ensure the vaccine is effective. Second, Personalised Proactive Healthcare enables a national Proactive Healthcare Strategy for cardiovascular disease and reduce healthcare cost. Third, Autonomous A-eye System with the aim of providing an autonomous A-eye system to prevent blindness using AI-powered image analysis. Fourth, AI-Nasoalveolar (AI-Na) System aimed to develop an AI-assisted predictive model CIAPAI Series of 3D printed pre-surgical nasoalveolar moulds (PNAM) with AI prediction on changes of cleft separation after the application of PNAM.

In addition to medical and healthcare issues, households in Malaysia have also lost their employment and income due to the actions taken by the Malaysian government and WHO as a response to contain the COVID-19 infection. Lockdown and MCOs affected economic sectors and activities, such as manufacturing, tourism, supply chains, that caused huge losses for businesses. This severely impacted the employment and labour market, particularly among young women and the low skilled and less educated (Rahman *et al*., 2021). According to the Department of Statistics Malaysia, the unemployment rate was 3.2% in January 2020, rising to 5.3% in May 2020. Although the government attempted several measures to overcome this crucial phenomenon, they seem to be inadequate in facilitating the unemployed and in preventing retrenchments (Lim, 2020). Despite issues of unemployment and poverty being indicated as crucial among youth communities, positive impacts were equally identified by Rahman *et al*. (2021) through their study on Malaysian youths' opinions on the impact of COVID-19 from economic and daily life perspectives. The study revealed that youths are striving towards digital business activities following new social norms. This transition of youths' mindset is timely as Malaysia is moving aggressively towards the digital economy and IR4.0. This trend is also consistent with McKinsey's insight on how Malaysia can navigate the future of work. McKinsey reported that 50% of work time in Malaysia is spent on repetitive tasks that are highly automatable. AI can potentially generate 6 million new jobs by 2030 in

Malaysia; this trend will require a new set of skills and knowledge in the economy (Koh and Manuel, 2020). Sheikh's (2020) study also portrayed positive perceptions about the relevance of AI towards the future of jobs in terms of creating space for more creative and cognitive tasks among the workforce instead of repetitive tasks.

The relevance of AI towards the education sector during and post-pandemic is inevitable. The government's action towards the movement control restrictions inflicted great stress on the education sector, comprising both school and higher education. The gradual shift from conventional classrooms to a virtual learning platform caused various concerns among students, teachers and parents' communities. The familiarisation towards virtual learning approaches and usage of various technological gadgets with emerging technological applications were an ultimate concern, particularly in the Malaysian context perhaps for being at the initial stage of digitalisation. In line with this, Sufian *et al*. (2020) highlighted multiple issues, such as utilisation of technological advancement, Internet access and student assessment processes, as effects of COVID-19 concerning virtual education. In the context of vulnerable groups, low socio-economic status, together with the exacerbated impact of the pandemic, caused students to face greater learning losses and increasing the opportunity gap (Harun *et al*., 2021; AWANI, 2021). The complications experienced by the whole community of the education system in Malaysia taught a great lesson that the technological revolution and digitalisation should be embraced consistently and wisely at all levels of community.

The Malaysia National AI Roadmap 2021-2025 (MOSTI, 2021) has highlighted three national AI-based education projects, namely, a personalised learning system to boost students' engagement and results using AI, an intelligent automated assessment system to support personalised learning systems, and an intelligent personalised learning system to boost students' engagement and results using AI. Based on AI's capabilities in leveraging big data, identifying common features and transforming them into a structural knowledge base, the relevance of AI can be seen as a beneficial feature of a new educational norm (Keok, 2020). Recently, generative AI, such as ChatGPT, has advanced rapidly, and has potential to significantly impact future generations and the future of education (Patel, 2023). ChatGPT is an artificial intelligence chatbot developed by OpenAI and released in November 2022. It has the capability of having an enormous amount of text data, enabling it to generate human-like and coherent responses, leading to more momentous and engaging conversations with users (Kalla and Smith, 2023). Kalla and Smith show the capability of this AI-powered system in helping both teachers and students in their teaching and learning path. This must be the ultimate reason for the recent trend of ChatGPT among students and scholars from high schools to university level. At this juncture, many more advanced and trending AI applications are emerging that have potential to reshape the educational landscape towards more approachable and sustainable in facing future uncertainties. Idris (2023) has urged Malaysia to incorporate AI into its national education agenda to ensure the workforce is equipped with required skills in the new economy.

The socio-economic impact of the recent pandemic on healthcare, employment and education undoubtedly had an impact on other socio-economic facets of people's daily life, e.g., emotions, relationships, support systems, food security, leisure activities and social interaction. Healthcare, employment and education are intercorrelated factors that have a strong influence on people's daily life. If AI has potential to mitigate the impacts of pandemics on these three major socio-economic aspects, it will be able to help people cope with their daily lives during other crises.

CORE CHALLENGES IN EXPEDITING AI

The diversity of society and development will inevitably make it challenging to rapidly advance the adoption of AI, both in Malaysia and internationally. However, developed economies with extensive expertise and exposure to AI applications and its capabilities would have overcome the various challenges in expediting this technology driver, even prior to the pandemic. This has given a wide range of opportunities for them to advance their AI adoption initiatives. It is essential for emerging countries, including Malaysia, to address the core challenges in embracing AI to expedite AI innovation.

In the Malaysian context, there are several core challenges concerning technology adoption in general and AI in particular, including the limitations of AI itself, that determine the acceptance level in society, digital divide and access to digital infrastructure, lack of expertise and funding (MOSTI, 2021; Harun *et al*., 2021). Despite the advantages of AI in tackling the 2020 pandemic, the limitations of AI in terms of trust and privacy plays an important role in determining the acceptance level in society (Piccialli *et al*., 2021; Williams *et al*., 2021). Recent surveys and studies have exposed the actual level of Malaysia in terms of digital divide and digital infrastructure that have been addressed through several prominent strategies and roadmaps. The same is true for core challenges of experts and funding, two fundamental resources for current and potential national AI projects to be successful. This will assure the country effectively mitigates the socio-economic impacts of future epidemics. Malaysia is expected to have a realistic and efficient scale of leveraging AI among people and businesses in order to safeguard the country from the impact of pandemics and achieve sustainable economic growth.

CONCLUSIONS

Malaysia has embarked on the digitalisation journey since the Multimedia Super Corridor (MSC) took place as part of the economic development project in the 1990s. Since then, Malaysia envisioned being a fully developed nation by 2020. Unfortunately, it has been discovered that Malaysia lacks several essential traits of a developed nation, and has yet to reach the status of high-income countries. The impact of previous economic crises and the recent pandemic have clearly shown the gaps and potentials for Malaysia to move forward and gain momentum to achieve a balanced economic growth. Technological advancement with AI innovations is indeed an essential requirement for Malaysia to have such economic

growth. This paper has reviewed numerous studies on AI interventions before and during pandemics. The relevance of AI in mitigating the socio-economic impacts of recent pandemics and future epidemics was discussed with reference to Malaysia. This includes the relevance of AI towards healthcare, employment and income, education and daily life, to comprehend Malaysia's experience and future direction.

FUNDING

This work is supported by IDRC Grant No. 109586 – 001 (20210101IDRC) for Artificial Intelligence Framework for Threat Assessment and Containment for COVID-19 and Future Epidemics while Mitigating the Socioeconomic Impact to Women, Children and Underprivileged Groups.

ACKNOWLEDGMENTS

The authors extend their appreciation to the IDRC, Canada, for funding this work (20210101IDRC).

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