

Navigating the Malaysian dilemma: Constructing a sustainable economy in the post-COVID-19 era

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Abstract: The Malaysian dilemma presents a complex challenge in the wake of the COVID-19 pandemic, requiring a comprehensive statistical analysis for the formulation of a sustainable economic framework. This study delves into the multifaceted aspects of reconstructing Malaysia's economy post-COVID-19, employing a data-driven approach to navigate the intricacies of the nation's economic landscape. The research focuses on key statistical indicators, including GDP growth, unemployment rates, and inflation, to assess the immediate and long-term impacts of the pandemic. Additionally, it examines the effectiveness of government interventions and stimulus packages in mitigating economic downturns and fostering recovery. A comparative analysis with pre-pandemic data provides valuable insights into the extent of economic resilience and identifies sectors that require targeted support for sustained growth. Furthermore, the study explores the role of technology and digital transformation in building a resilient economy, considering the accelerated shift towards remote work and digital transactions during the pandemic. The analysis incorporates data on technological adoption rates, digital infrastructure development, and innovation ecosystems to gauge their contributions to economic sustainability. Addressing the Malaysian Dilemma also involves an examination of social and environmental dimensions. The study investigates the impact of economic policies on income distribution, social equity, and environmental sustainability, aiming to achieve sustainable economic growth. The study contributes a nuanced analysis to guide policymakers and stakeholders in constructing a sustainable post-COVID-19 economy in Malaysia.

Keywords: sustainable economy; post-COVID-19; government policies; stakeholder engagement; Malaysia; resilience; sectoral analysis

1. Introduction

Malaysia, a Southeast Asian nation known for its diverse culture and vibrant economy, has undergone remarkable economic transformations over the years and from its agricultural roots to becoming a significant player in the global market and its economic history is a testament to resilience and adaptability (Ngu et al., 2020). However, the advent of the COVID-19 pandemic in 2019 marked a critical turning point, challenging the nation's economic stability and demanding strategic responses to navigate the post-pandemic era (Menhat et al., 2021). The COVID-19 pandemic significantly impacted Malaysia's GDP growth, with the economy contracting by approximately 5.6% in 2020 (Kumar, 2021). Unemployment rates surged to 5.3%, particularly affecting sectors like tourism and hospitality (Altig et al., 2020). Disruptions in global supply chains and decreased demand for exports further

exacerbated economic challenges (Kumar, 2021). Inflation was influenced by supply chain disruptions and changes in consumer behavior (Jomthanachai et al., 2022). The pandemic accelerated digital transformation, benefiting technology and e-commerce sectors, while essential sectors like agriculture remained resilient. The government implemented stimulus packages to support affected businesses and individuals (Lim et al., 2021). Successful vaccination campaigns contributed to gradual economic recovery (Kumar, 2021).

1.1. Problem statement

While Malaysia has historically demonstrated economic resilience and adaptability, the onset of the COVID-19 pandemic has posed significant challenges to its economic stability and growth trajectory (Hashim et al., 2021). Despite government interventions and stimulus packages aimed at mitigating the pandemic's impact, various sectors of the economy have been severely affected, leading to increased unemployment, disruptions in global trade, and heightened economic uncertainties. As Malaysia strives towards post-pandemic recovery and sustainable growth, there remains a pressing need to identify and address the underlying issues hindering effective economic revitalization (Kang and Arikrishnan, 2024). The focus is on comprehending the persistent economic challenges exacerbated by the pandemic and devising precise strategies to promote resilient and inclusive economic recovery in Malaysia.

1.2. Objective

The research aims to evaluate the impact of the COVID-19 pandemic on Malaysia's economy and assess the effectiveness of government interventions in fostering sustainable development (Lim et al., 2021). Evaluations will be conducted on government stimulus packages, financial aid, and policy responses' efficacy in supporting businesses and individuals (Altig et al., 2020). Challenges in implementing and distributing government support will be identified, and evidence-based strategies for post-pandemic economic recovery proposed (Jomthanachai et al., 2022). The research seeks to provide insights for policymakers, stakeholders, and researchers, contributing to informed decision-making and future policy interventions (Kumar, 2021). Additionally, it aims to enrich academic literature by comprehensively analyzing Malaysia's economic response to the pandemic (Lim et al., 2021).

2. Materials and methods

2.1. Literature review

2.1.1. Economic performance

Before the COVID-19 pandemic, Malaysia demonstrated steady economic growth. From 2015 to 2019, the country experienced an average GDP growth rate of 4%–5% annually (Devadas et al., 2020). This growth was driven by robust domestic demand, supported by private consumption, investment, and government expenditure. Inflation remained moderate, averaging around 1.6%–2% (The Star, 2019). The government's fiscal and monetary policies were instrumental in ensuring price

stability and managing inflationary pressures. The Malaysian economy was diversified, with contributions from various sectors. The manufacturing sector, particularly export-oriented industries such as electronics and automotive, played a significant role in driving economic growth (Annamalah, 2009; Yin and Wan Usamah, 2022). Manufacturing accounted for a substantial portion of Malaysia's GDP, reflecting the country's transition from agriculture to industrialization. The services sector was also a key contributor to GDP, encompassing industries such as tourism, finance, retail, and telecommunications. Tourism was a significant contributor to Malaysia's economy, attracting millions of international visitors each year (Annamalah et al., 2016a). Malaysia's strengths included its diversified economy, strong manufacturing base, and strategic location in Southeast Asia. The country's infrastructure development and pro-business policies attracted foreign investment, contributing to economic growth (Naidu and Moorthy, 2021). Opportunities for Malaysia included further diversification of its economy, technological advancements, and regional integration through initiatives such as the Association of Southeast Asian Nations (ASEAN) (Park, 2024).

2.1.2. Economic indicators

The COVID-19 pandemic significantly impacted Malaysia's GDP growth as shown in **Figure 1** and according to the World Bank, Malaysia's GDP contracted by 5.6% in 2020, marking its worst economic performance since the Asian financial crisis in 1998 (World Bank, 2021). The contraction was primarily due to reduced economic activities caused by lockdown measures and disruptions to global trade. The pandemic led to a sharp increase in unemployment rates as it was reported that the unemployment rate rose to 5.3% in May 2020, the highest in over a decade (DOSM, 2022). This increase was attributed to widespread job losses across various sectors, particularly in industries heavily impacted by lockdowns such as tourism, hospitality, and retail. Inflation in Malaysia was relatively subdued during the pandemic. The Consumer Price Index (CPI) recorded modest increases, reflecting subdued consumer demand and lower energy prices (DOSM, 2022). However, disruptions to the supply chains and increased production costs in certain sectors contributed to the inflationary pressures. Malaysia's trade balance was affected by disruptions due to the global trade caused by the pandemic. While exports initially declined due to reduced demand from key trading partners, imports also fell as domestic consumption weakened.

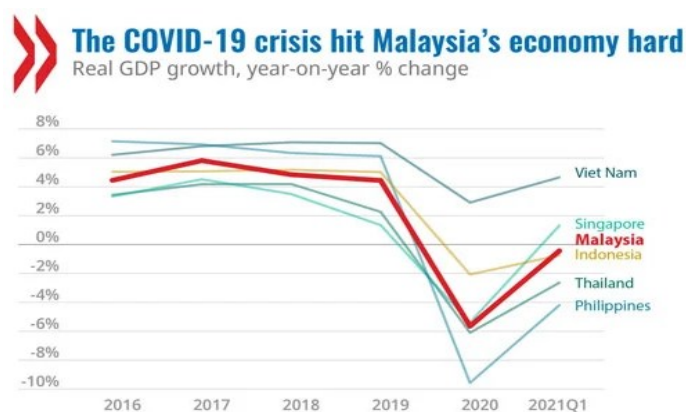


Figure 1. Real GDP growth (OECD Economic Survey, 2021).

Malaysia's tourism industry suffered severe disruptions due to travel restrictions and border closures. International tourist arrivals plummeted by 83.4% in 2020 compared to the previous year, leading to significant revenue losses for the hospitality sector (Tourism Malaysia, 2021). The closure of tourist attractions, hotels, and airlines resulted in widespread job losses and business closures. The manufacturing sector, particularly export-oriented industries, faced challenges due to disruptions in global supply chains and reduced demand for goods. It was also reported that the manufacturing Purchasing Managers' Index (PMI) fell sharply during the height of the pandemic-induced lockdowns (MIER, 2020). Industries such as electronics and automotive, which are major contributors to Malaysia's exports, experienced production slowdowns and reduced export volumes. The agriculture sector encountered labour shortages and logistical challenges during the pandemic. Movement restrictions and border closures disrupted the supply of migrant workers crucial for agricultural activities, impacting the production and distribution of agricultural products and affecting food security and supply chains (Ministry of Agriculture and Food Industries, 2020). The financial sector in Malaysia faced challenges in managing the economic fallout from the pandemic as the banks implemented loan moratoriums and financial relief measures to support businesses and individuals affected by the crisis (Bank Negara Malaysia, 2020). However, the prolonged economic downturn strained the financial health of businesses and households, leading to concerns about loan defaults and financial stability. These sectoral vulnerabilities and disruptions underscored the multifaceted challenges faced by Malaysia's economy during the COVID-19 pandemic, necessitating coordinated policy responses to support recovery and resilience.

2.1.3. Technology adoption and digital transformation

The COVID-19 pandemic accelerated digital transformation across industries. Businesses, governments, and individuals embraced technologies for remote work, online education, e-commerce, and healthcare (Kutnjak, 2021). High technology adoption rates were witnessed in areas like 5G networks, broadband expansion, and increased internet connectivity, facilitating remote work and online activities. Governments recognized the importance of digital infrastructure and invested in improving connectivity, including investments in 5G networks, broadband expansion, and digital inclusion initiatives. Digital infrastructure development included the enhancement of e-government services, enabling more efficient and accessible public services (Garcia-Rio et al., 2023). Innovation ecosystems thrived in the post-COVID-19 era, with start-ups and technology hubs playing a key role. Governments and private sectors supported innovation through funding, mentorship, and collaboration opportunities. There was increased innovation in health technology, including telemedicine, remote patient monitoring, and health data analytics. The government looked to leverage technology for economic diversification by promoting tech-driven industries such as fintech, biotech, and clean energy, with an emphasis on developing a robust digital economy that encompassed e-commerce, digital services, and technology-driven manufacturing. Job creation opportunities emerged in technology-related fields; therefore, governments and private entities invested in the development of tech skills through education and training programs (Sutton et al., 2024). The

increased adoption of remote work technologies created opportunities for job seekers regardless of geographical location. Additionally, technology adoption led to increased productivity through the automation of routine tasks and the integration of artificial intelligence (AI) in various industries. Enhanced productivity was supported by efficient collaboration tools, enabling seamless communication and project management. Therefore, addressing the digital divide was crucial to ensure that the benefits of technology adoption were accessible to all segments of the population. With increased reliance on technology, it was necessary to address cybersecurity challenges to protect sensitive data and digital infrastructure. Additionally, there was an opportunity to focus on green technologies and sustainable practices within the technology sector, aligning with global efforts toward environmental sustainability (Schmitt, 2023). Collaborative initiatives with other countries and international organizations fostered technology exchange, innovation, and market access. These partnerships also enhanced research and development, improved regulatory standards, and provided access to a broader talent pool. Additionally, these initiatives helped address global challenges by promoting shared solutions and best practices.

2.1.4. Government responses and economic stimulus measures

In response to the economic challenges posed by the pandemic, the Malaysian government implemented a series of economic stimulus packages and these initiatives aimed to safeguard businesses, protect jobs, and stimulate economic recovery (Shah et al., 2020). The Economic Stimulus Package (people), launched in March 2020, allocated funds for healthcare, social welfare, and assistance to affected businesses and subsequent packages, including Economic Recovery Plan and Economic and People's Protection Assistance Package, targeted specific sectors, providing financial aid, tax incentives, and grants to stimulate economic activities (Hong, 2023). The government's commitment to fiscal measures aimed at addressing the immediate impact of the pandemic showcased a determination to protect both businesses and individuals from the economic fallout for the stimulus package.

2.1.5. COVID-19 economic stimulus measures

Between February 2020 and June 2021, Malaysia introduced nine different stimulus packages totaling RM 530 billion (USD 126.2 billion), which is almost double the initial 2020 budget of RM 297 billion (USD 70.7 billion). Of the RM 530 billion, RM 82.9 billion (USD 19.74 billion) was direct fiscal injection (MOF, 2021). These packages focused on three primary areas: supporting people, revitalizing businesses, and boosting the economy. The timeline and total amount for each stimulus package are detailed in **Table 1**. During the initial quarter of 2020, the pandemic's effects were primarily felt in sectors reliant on tourism, such as airlines, tour operators, hospitality, and dining establishments. In reaction, the government introduced the Economic Stimulus Package 2020, totaling RM20 billion (USD 4.76 billion), on 27 February 2020 (MOF, 2021). This initiative aimed to bolster healthcare infrastructure to manage the outbreak, assist affected businesses with cash flow, and revitalize the domestic tourism sector (MOF, 2021). After the initial Movement Control Order (MCO) announcement, the Economic Stimulus Package (people) was introduced on 27 March 2020. This extensive package, totaling RM 230 billion (USD 54.8 billion), prioritized bolstering healthcare resources, acquiring medical equipment,

expanding testing capabilities, and implementing digital contact tracing (MOF, 2021). Additionally, it included one-time cash transfers to mitigate income losses, as well as three months of limited wage subsidies aimed at incentivizing businesses to retain their workforce. The Economic Stimulus Package (people) also featured an automatic six-month moratorium on loan repayments for households, which concluded in September 2020, partially aimed at stimulating private consumption. With only RM 25 billion (USD 5.96 billion) injected directly into fiscal measures, the extent and duration of direct support provided through Economic Stimulus Package (people) were limited in both scope and timeframe and to alleviate the financial strain caused by lockdown measures, the government permitted private sector employees to withdraw funds from their discretionary pension accounts in the Employees Provident Fund (EPF), with a maximum withdrawal limit of RM 6000 (USD 1429) over a period of 12 months (MOF, 2021). This financial assistance initiative garnered significant popularity, highlighting the acute financial pressures faced by households. Additionally, the compulsory monthly minimum employee salary contribution to the EPF was reduced from 11% to 7% to enhance disposable income. The lockdown significantly impacted SMEs, leading to cash flow difficulties. The soft loan measures in the Economic Stimulus Package were considered inadequate. An Additional Economic Stimulus Package (SMEs) worth RM 10 billion (USD 2.38 billion) was announced, consisting entirely of direct fiscal injection (MOF, 2021). This package encompassed a special grant for micro-enterprises and supplementary wage subsidies. As the lockdown measures shifted from MCO to CMCO, the government introduced a '6R' strategy, encompassing Resolve, Resilience, Restart, Recovery, Revitalize, and Reform. Resolve marked the initial lockdown aimed at flattening the pandemic curve, while the Economic Stimulus Package represented the resilience phase. The relaxation denoted the Restart stage, followed by the introduction of a new package, the Short-Term Economic Recovery Plan, valued at RM 35 billion (USD 8.33 billion), with RM10 billion allocated for direct fiscal injection during the recovery phase (MOF, 2021). The National Economic Recovery Plan was centered on reigniting economic activity by encouraging individuals and businesses to resume operations within what was perceived as the "new normal" at the time. The Recovery Movement Control Order (RMCO) nearly removed all restrictions, placing responsibility on businesses to self-regulate while complying with standard operating procedures (SOPs). The plan also encompassed another round of one-time cash assistance for disadvantaged low-income segments, an extension of the wage subsidy program, the creation of a reskilling fund, provisions for financing and liquidity support, incentives for e-commerce, and tax exemptions. The Supplementary Economic Stimulus Package Initiative, totaling RM 10 billion (USD 2.38 billion), was aimed at supporting micro-SMEs, local employees, and individuals within the lower 80th percentile of the income distribution (MOF, 2021). A more focused loan moratorium was also provided to businesses and individuals to alleviate financial obligations. The Temporary Measures to Reduce the Impact of Coronavirus 2019 (COVID-19) Act of 2020 was introduced to grant exemption or relief to individuals unable to fulfill their contractual obligations, such as rent payments, due to the epidemic's spread. Additionally, the Government enacted the Temporary Measures for Government Financing (Coronavirus Disease, 2019) Act, which temporarily increased the statutory debt level to 60% of GDP from

the previous 55%, effective until 2022 (MOF, 2021). This marked the first increase since July 2009 during the Global Financial Crisis. Under this Act, Parliament approved a ceiling allocation of RM 45 billion (USD 10.7 billion) for the COVID-19 Fund.

Table 1. Summary of Malaysia’s stimulus packages, 2020–2021.

Date	Days since tighter restrictions announced*	Terms	Total size (RM billion)	Fiscal injection (RM Billion)	% Fiscal injection
27/2/20	N/A	Economic Stimulus Package	20	-	-
27/3/20	11	Economic Stimulus Package (People)	230	25	10.9
6/4/20	20	Economic Stimulus Package (SMEs)	10	10	100.0
5/6/20	N/A	Short-Term Economic Recovery Plan	35	10	28.6
23/9/20	N/A	Supplementary Initiative Package	10	10	100.0
18/1/21	8	Strategic Program to Empower the People and the Economy	15	1.9	12.7
17/3/21	55	Strategic Program to Empower the People and the Economy	20	11	55.0
31/5/21	3	Strategic Program to Empower the People and the Economy (Additional)	40	5	12.5
28/6/21	1***	People’s Protection and Economic Recovery Package.	150	10	6.7
		Total	530	82.9	15.6

Source: Malaysia Ministry of Finance (MOF) (2021).

Note: The notation “1***” in the table is explained as “number of days yet to be determined as Malaysia continues with an indefinite nationwide lockdown.”

2.1.6. Shifts in consumer behaviour and digital transformation

The pandemic-induced lockdowns led to a fundamental shift in consumer behaviour, accelerating the adoption of digital technologies. E-commerce and online services experienced significant growth as consumers adapted to remote work and digital transactions, while the government’s Digital Malaysia initiative gained prominence, emphasizing the importance of digital literacy and infrastructure in fostering economic resilience (Alwan et al., 2023). This shift not only opened new opportunities for businesses but also underscored the necessity of robust digital infrastructure for future economic sustainability. The Malaysian economy began to witness a transformation, with technology-driven industries gaining prominence as the nation sought to diversify its economic base. Malaysia’s economic history reflected a narrative of adaptability and resilience. From its agrarian roots to becoming a global player in trade and industry, the nation had weathered numerous challenges. The impact of COVID-19, while significant, prompted the government to implement decisive measures to mitigate the economic fallout. As Malaysia navigated the path forward, a diversified economy, digital transformation, and a commitment to sustainable practices emerged as key pillars for future growth as the post-pandemic era offered an opportunity for Malaysia to reevaluate its economic strategies, fostering innovation, inclusivity, and environmental sustainability (Torabi et al., 2023). As Malaysia emerged from the unprecedented challenges posed by the COVID-19 pandemic, the imperative for constructing a sustainable economic model became increasingly apparent. The pandemic had not only exposed vulnerabilities in traditional economic structures but had also underscored the need for resilience,

adaptability, and a long-term vision. In this context, shaping a sustainable economic model was not just a choice but a necessity for the nation's future well-being (D'Orazio, 2023). The pandemic had laid bare the vulnerabilities inherent in Malaysia's traditional economic pillars. Overreliance on specific sectors, such as palm oil and tourism, had left the nation exposed to external shocks, disrupting supply chains, and creating economic instability. The need to diversify and build resilience against such externalities was evident, and a sustainable economic model served as the linchpin for achieving this diversification.

2.1.7. Economic diversification

Malaysia's economic diversification was imperative for reducing dependency on sectors susceptible to global disruptions. Diversification efforts led to a more robust and adaptable economic structure, whereby allocating resources to nurture emerging industries, such as technology, renewable energy, and advanced manufacturing, was crucial (Liu et al., 2024). Statistical evidence supported the positive correlation between investments in these sectors and economic resilience. The pandemic accelerated the digital shift in consumer behaviour and business operations, highlighting the growth of e-commerce, online services, and digital literacy. A sustainable economic model must prioritize digital transformation for continued competitiveness, as digitalization brought about opportunities for job creation and skills development (Martínez-Peláez et al., 2023). Employment trends and skill acquisition in technology-related fields underscored the potential for building a digitally skilled workforce. Malaysia's commitment to environmental sustainability was crucial, given global concerns about the environmental impact of industries, guiding efforts toward reducing the carbon footprint. The increase in investment in renewable energy sources emphasized the importance of transitioning to sustainable practices, whereby a sustainable economic model must prioritize clean energy initiatives for both environmental and economic benefits (Zhou et al., 2023). The effects of inclusive policies on income distribution and social stability were essential, and the post-pandemic economic model should have been centred around policies that addressed inequalities and created a more equitable society. A sustainable economic model required substantial investments in education and healthcare. The correlation between investments and economic development underscored the importance of human capital in sustainable growth, as the impact of global collaborations on trade volumes, foreign direct investment, and economic stability provided insights into the benefits of international engagement (Sharif et al., 2023). Malaysia's sustainable economic model should have actively pursued and strengthened such collaborations. Embracing sustainability has positioned Malaysia as a key player in the global green economy. Evidence supports the economic benefits of aligning with global sustainability trends, such as attracting investments and enhancing the nation's global standing (Popescu, 2020).

Malaysia's sustainable economic model also hinges significantly on strategic investments in education and healthcare as investing in education is paramount for nurturing a skilled and adaptable workforce (Kouskoura et al., 2024). Quality education equips individuals with the knowledge and skills needed to thrive in evolving industries, fostering innovation and productivity. By prioritizing education,

Malaysia can cultivate a talent pool capable of driving economic growth and competitiveness in the global market. Similarly, healthcare investment is essential for promoting a healthy population and bolstering productivity as accessibility and high-quality healthcare services ensure that citizens remain physically and mentally fit to contribute effectively to the economy (Zheng et al., 2024). Moreover, investing in healthcare infrastructure and research fosters innovation and attracts investment in the healthcare sector, further boosting economic development. Nations that prioritize these sectors typically experience higher levels of human capital development, leading to increased labour force participation, higher incomes, and overall economic advancement (Yang et al., 2024). By channeling resources into education and healthcare, Malaysia not only enhances the well-being of its citizens but also lays the groundwork for sustained economic growth. A skilled and healthy workforce forms the backbone of a resilient economy, capable of overcoming challenges and seizing opportunities in an increasingly competitive global landscape. Therefore, integrating investments in education and healthcare into Malaysia's sustainable economic model is imperative for fostering inclusive growth and securing long-term prosperity. The COVID-19 pandemic has underscored the necessity of robust education and healthcare systems for Malaysia's resilience and sustainable growth. During the pandemic, the shift to online learning and the strain on healthcare services highlighted existing gaps and the need for adaptive strategies. Post-pandemic, Malaysia is focused on transforming these sectors to be more resilient, inclusive, and future-ready. Investments in digital infrastructure, blended learning models, teacher training, and curriculum development are crucial for ensuring quality education. Similarly, strengthening healthcare infrastructure, public health initiatives, and medical research will enhance the healthcare system's capacity to handle future crises. The synergy between education and healthcare investments is essential for building a skilled, healthy, and productive workforce, driving Malaysia's sustainable economic growth (Osathanunkul et al., 2023). By prioritizing these sectors, Malaysia can ensure inclusive growth and long-term prosperity, positioning itself as a resilient and competitive nation in the global landscape.

2.1.8. Global diversification lessons for Malaysia

Incorporating successful economic diversification from other countries can offer tangible illustrations of the advantages and approaches that Malaysia might adopt for its own diversification efforts. South Korea's transformation from a primarily agrarian economy to a global technology powerhouse is a well-documented success story as the government played a crucial role in this transformation by investing heavily in education and research, fostering a skilled workforce and innovation-driven economy (Eichengreen et al., 2020). Key industries like electronics, automotive, and shipbuilding were nurtured through targeted policies and support for research and development. South Korea's economy is currently highly diversified, with technology exports contributing significantly to its GDP. Singapore's economy has evolved from a manufacturing hub to a diversified economy with a strong focus on finance, technology, and services as the government's proactive approach to economic planning and investment in education, infrastructure, and technology has been instrumental in this transition (Cheang, 2024). Singapore has also positioned itself as

a regional hub for finance and trade, attracting foreign investment and fostering a vibrant business environment. Germany's diversified economy is built on a foundation of innovation and manufacturing excellence as the country's SMEs specializes in niche markets and high-value manufacturing. Germany's success can be attributed to its emphasis on vocational training, strong research institutions, and collaboration between industry and academia (Mordhorst and Jenert, 2023). By focusing on quality and specialization, Germany has maintained a competitive edge in various industries, including automotive, engineering, and pharmaceuticals. Norway's economy, traditionally reliant on oil and gas exports, has successfully diversified into renewable energy and technology sectors as the government's sovereign wealth fund, fuelled by oil revenues, has been instrumental in funding innovation and infrastructure projects (Sletten et al., 2023). Norway's commitment to sustainability has led to significant investments in renewable energy sources like hydropower and wind, positioning the country as a leader in green technology. By referencing these models, Malaysia can glean insights into the strategies and policies that have proven effective in diversifying economies and promoting sustainable growth. These strategies from other countries enables Malaysia to replicate similar success in diversifying its economy and reducing reliance on sectors vulnerable to global disruptions.

2.1.9. Macroeconomic management

In response to the COVID-19 outbreak, the Malaysian government implemented various policies and programs to sustain economic activities and strive for economic growth. Technologically driven pandemic control initiatives, such as the utilization of facial recognition technology and big data to monitor population movement and spatial distribution, presented opportunities for the integration of these advanced technologies into various industries (Moy et al., 2023). Furthermore, international collaboration efforts, including the provision of biomedical products and medical supplies to developing nations, enhance the presence of Malaysian goods in these markets, thereby boosting exports. The Malaysian government adopted a strategy focusing on domestic demand-led growth to address the unprecedented disruptions caused by the pandemic on global trade. Additionally, the government provided robust fiscal incentives to the manufacturing sector, encouraging manufacturers to adapt their production capabilities to meet the rising demand for pandemic control supplies (Alves-Passoni and Neria, 2023). The country's labour-intensive manufacturing sector has been a crucial driver of its growth for over four decades. During the COVID-19 pandemic, the Malaysian government implemented various measures, such as smart lockdowns, public health interventions, and amendments to laws and regulations, to control the spread of the virus and maintain the health of the workforce (Lauri et al., 2023). While the government's stringent measures, including lockdowns and COVID-19 testing requirements, may have led to a sharp decline in economic activities in the short term, they are expected to better facilitate the country's economic recovery from the pandemic shock in the long run. Moreover, the country's sizable domestic market provides a significant advantage for promoting the commercial adoption of technological advancements, such as intelligent manufacturing, achieved during the pandemic. As a result, Malaysia's economy has witnessed a rapid recovery starting from the second quarter of 2023 (Rasit et al., 2023).

2.1.10. Quantification of economic resilience

Economic resilience, particularly in the context of Malaysia's post-COVID-19 recovery, refers to the ability of the economy to withstand and recover from external shocks, such as the pandemic, while maintaining or returning to a state of stability and growth (Yuhertiana et al., 2022). This concept draws parallels with ecological resilience, emphasizing the capacity of Malaysia's economic system to absorb and adapt to disruptions, ultimately bouncing back to a balanced state. In practical terms, economic resilience manifests through the country's ability to navigate challenges, preserve economic fundamentals, and restore confidence in its economic prospects and the key indicators of economic resilience include the ability to withstand shocks without significant disruptions to essential services, employment stability, the resilience of supply chains, and the effectiveness of policy responses in mitigating the impact of shocks (Hu et al., 2022). The concept of economic resilience encompasses two main components which is resistance and recovery. Resistance refers to country's ability to withstand shocks, such as the initial impact of COVID-19 on its economy. This involves factors like the strength of financial institutions, the robustness of regulatory frameworks, and the level of diversification within key sectors. Recovery, on the other hand, pertains to country's ability to bounce back from the shock and return to a trajectory of sustainable growth. This includes measures such as stimulus packages, investment in infrastructure, and support for affected industries to facilitate a swift and comprehensive recovery. Various methods can be employed to measure economic resilience, and these may include a multi-indicator approach, encompassing factors such as macroeconomic stability, market efficiency, governance quality, and social development (Hu et al., 2022). Alternatively, single indicators, such as unemployment rates or GDP growth rates, can provide insights into the economy's resilience following a crisis event. Assessing Malaysia's economic resilience post-COVID-19 involves analysing a range of factors, including the effectiveness of policy responses, the adaptability of businesses and industries, the resilience of the labour market, and the overall trajectory of economic recovery (Ibn-Mohammed et al., 2021). By understanding and enhancing its economic resilience, Malaysia can better prepare for future shocks and challenges while fostering sustainable growth and development.

2.1.11. Sustainable economic initiatives

Malaysia's push toward green technology involves promoting the adoption of environmentally friendly technologies across industries as the pandemic may have accelerated the awareness and adoption of green technologies as part of a sustainable recovery plan as environmental regulations and standards are crucial for promoting sustainability (Raihan et al., 2023). The government have strengthened or introduced new regulations to ensure industries adhere to environmentally friendly practices. Green Technology Master Plan (GTMP) is a strategic plan developed by the Malaysian government to promote the adoption of green technologies across various sectors as it aims to drive sustainable development, enhance environmental performance, and reduce the carbon footprint of economic activities (Chuweni et al., 2024). The plan includes initiatives to increase energy efficiency, promote renewable energy, and encourage the use of eco-friendly technologies. The GTMP emphasizes the development and integration of renewable energy sources, such as solar, wind, and

biomass, to reduce dependence on fossil fuels and lower carbon emissions associated with energy production. The GTMP include measures to improve waste management practices and promote a circular economy. Proper waste disposal and recycling initiatives can contribute to lowering greenhouse gas emissions. The GTMP also include measures to enforce environmental regulations and encourage industries to adopt cleaner technologies. The post-pandemic period offers an opportunity for governments to integrate green and sustainable practices into their recovery plans. Growing public awareness and support for sustainable practices can influence the success of green initiatives. Promoting a circular economy involves minimizing waste and maximizing resource efficiency and post-pandemic and there have been efforts to integrate circular economy principles into various sectors (Kurniawan et al., 2023).

2.1.12. Driving sustainability

Adopting sustainable practices can lead to cost savings for businesses. Energy-efficient measures, waste reduction, and resource optimization contributes to lower operational costs in the long run. There is a growing global demand for sustainable products and services and therefore businesses that incorporate sustainable practices may access new markets and attract environmentally conscious consumers (Rizomyliotis, 2024). Embracing sustainability often drives innovation and companies that invest in green technologies and practices that enhances the competitiveness by differentiating themselves in the market and meeting changing consumer preferences. Sustainable practices can mitigate risks associated with environmental and social issues and therefore organisations that are proactive in addressing environmental concerns are better equipped to manage regulatory changes and public scrutiny (Nishant et al., 2020). Monitoring investments in sustainable projects, whether in renewable energy, sustainable agriculture, or eco-friendly technologies, provides evidence of the business community's commitment to sustainability. The emergence of sustainable finance and investments, including green bonds and sustainable investment funds, reflects a growing interest in environmentally and socially responsible initiatives (Filippini et al., 2024).

2.1.13. Exploring alternative economic models for sustainable recovery

The COVID-19 pandemic has not only highlighted vulnerabilities in global supply chains but also underscored the importance of resilience, adaptability, and sustainability in economic systems. In the aftermath of the pandemic, there's a growing awareness of the need to reduce waste and resource consumption. Adopting a circular economy model can help Malaysia build back better by promoting resource efficiency, reducing reliance on imports, and creating new revenue streams from waste management and recycling industries (Herrador and Van, 2024). This model aligns well with the government's efforts to transition towards a low-carbon economy. As countries strive to recover from the economic downturn caused by the pandemic, there's an opportunity to prioritize green investments that simultaneously stimulate economic growth. Malaysia can leverage its abundant natural resources to expand renewable energy infrastructure, create green jobs, and enhance energy security and also investments in green infrastructure projects, such as public transportation and sustainable buildings, can also spur economic activity while reducing carbon emissions (Zhang et al., 2024). The pandemic has underscored the importance of

sustainable management of marine resources, especially for coastal communities reliant on fishing and tourism. Malaysia's rich marine biodiversity presents opportunities for sustainable economic development through activities such as sustainable fisheries management, marine conservation, and eco-tourism and by promoting responsible stewardship of ocean resources, Malaysia can build resilience in coastal economies and enhance food security (Chee et al., 2024). The pandemic has exacerbated inequalities and highlighted the importance of social safety nets and community resilience. Malaysia can foster inclusive economic recovery by supporting social enterprises, cooperatives, and community-based organizations that address pressing social needs, such as healthcare, education, and poverty alleviation and by empowering marginalized communities and promoting equitable access to economic opportunities, Malaysia can build a more resilient and cohesive society (Rangsunnoen et al., 2024). The shift towards remote work and digitalization accelerated by the pandemic presents opportunities for Malaysia to strengthen its knowledge-based economy. Investing in digital infrastructure, enhancing digital literacy, and supporting innovation ecosystems can spur entrepreneurship, attract foreign investment, and drive economic diversification (Khurana et al., 2022). By leveraging technology and knowledge-intensive industries, Malaysia can position itself as a hub for innovation and talent in the post-pandemic era.

2.1.14. Fostering economic stability

Inclusive policies play a pivotal role in promoting economic stability post-pandemic and these policies are designed to address disparities, ensure equal opportunities, and foster social cohesion, contributing to a more resilient and sustainable economy (Kaftan et al., 2023). Inclusive policies should include programs specifically aimed at creating job opportunities for vulnerable populations, such as low-income individuals, persons with disabilities, and marginalized communities. Policies that provide financial assistance, training, and resources to those owned by vulnerable groups, contribute to economic stability by fostering entrepreneurship and local economic development (Wasserman et al., 2020). Inclusive policies involve the expansion or improvement of social safety nets, ensuring that financial assistance reaches those who need it most as this helps reduce poverty and inequality, contributing to overall economic stability. Setting fair and inclusive minimum wage policies to uplift the income of low-wage workers, reduce income inequality, and enhance the purchasing power of a significant portion of the population, along with implementing inclusive education policies that provide equal access to quality education, can foster a skilled and adaptable workforce (Giupponi et al., 2024). A well-educated population contributes to economic productivity and innovation and policies that focus on providing skills training and retraining opportunities to vulnerable populations enhance employability, helping individuals transition into growing sectors of the economy (Dhrifi et al., 2021). Inclusive policies promoting financial inclusion ensure that all segments of society, including vulnerable populations, have access to middle income as this can empower individuals economically and contribute to overall economic stability (Annamalah et al., 2016b). Policies that ensure inclusive access to healthcare services contribute to a healthier and more productive workforce and this is particularly crucial post-pandemic to address health issues and prevent the spread

of diseases. Inclusive policies addressing mental health concerns contribute to a resilient workforce by reducing absenteeism and promoting overall productivity, while inclusive policies promoting gender equality in the workforce also contribute to economic stability by tapping into the full potential of the population (Parenteau et al., 2022). Encouraging women's participation in the labour market also enhances diversity and innovation. Policies that address the economic challenges faced by minority groups contribute to social harmony and stability, ensuring that no group is left behind in the economic recovery process. Inclusive policies foster social cohesion by promoting the integration of vulnerable populations into the broader community. Social stability is a crucial foundation for economic stability and by addressing disparities and promoting a more equitable distribution of resources, inclusive policies contribute to a more stable and harmonious society (van Niekerk, 2020).

3. Methodology

Various sources of data have been employed to analyze the impact of the COVID-19 pandemic on Malaysia's economy, utilizing data mining techniques to uncover hidden patterns, trends, and insights across different sectors (Sheng et al., 2021). Government reports, economic indicators, financial statements, market research reports, academic studies, news articles, and industry experts opinion have been instrumental in this analysis. Government reports, such as those from the Department of Statistics in Malaysia, provide crucial data on GDP growth rates, unemployment figures, consumer spending patterns, business closures, and government stimulus measures (DOSM, 2022). The data offers insights into job losses and employment trends across different industries, aiding in understanding the pandemic's impact on the labor market. Data from the National Association of Purchasing Managers (NAPM) and market research firms such as Nielsen have provided valuable insights into consumer sentiment, purchasing behavior, and business confidence. Key economic indicators, including retail sales, industrial production, housing starts, and consumer price indices, offer quantitative measures of economic activity and performance. Data from the Department of Statistics, Central Bank reports, and the Department of Housing and Urban Development provide valuable insights into retail sales trends and the health of the economy. Financial statements from publicly traded companies listed on BURSA Malaysia and data from Malaysian Central Bank offer insights into their financial performance. Analyzing earnings reports, revenue trends, and profit margins provides sector-specific insights on businesses. Market research reports from firms like McKinsey & Company and Euromonitor International offer data on shifts in consumer behavior, emerging market trends, and industry forecasts. These reports provide valuable market intelligence for businesses and policymakers, aiding in decision-making. Academic studies and research papers provide data-driven insights into the pandemic's broader economic implications, including the effectiveness of government stimulus programs and sector-specific vulnerabilities (Briones et al., 2022). Analysis of news articles from reputable sources such as The New York Times and The Economist offers insights into events, trends, and narratives related to the pandemic's economic impact. Publications from think tanks and research institutes, including the Brookings Institution and the Peterson Institute for International

Economics, offer in-depth analysis and policy recommendations on economic issues related to the pandemic. Analyzing policy documents and outcomes helps identify strengths, weaknesses, and areas for improvement in policy responses, contributing to evidence-based decision-making and policy formulation (Uneke et al., 2020).

4. Results

4.1. Sustainable technology drive

Across several Southeast Asian countries, including Singapore, Indonesia, Thailand, and Vietnam, there is a concerted effort to drive technological advancement, address socio-economic challenges post-pandemic, and promote sustainability (Sundram and Brennan, 2024). Each country has identified specific technology and socio-economic drivers, such as tech innovation projects, e-commerce development, smart infrastructure, and IT infrastructure upgrades. These initiatives aim to create jobs, enhance labour flexibility, promote tourism, and improve infrastructure. In terms of sustainability initiatives, there's a focus on areas such as green infrastructure, sustainable urban development, clean energy transition, biodiversity conservation, sustainable tourism practices, and circular economy initiatives (Wuyts, 2024). These efforts are reflected in various metrics such as renewable energy capacity, carbon emissions, forest cover, waste recycling rates, and environmental expenditure. Among these countries, Malaysia stands out with its comprehensive approach to digitalization initiatives and upskilling/reskilling programs, particularly in the education sector. It has also prioritized renewable energy adoption and environmental conservation alongside its technological advancements (Bikar et al., 2023). Malaysia's renewable energy capacity is significant at 10,500 MW, contributing to a substantial reduction in carbon emissions, and its efforts to preserve forest cover and increase waste recycling rates demonstrate a strong commitment to environmental sustainability (ADB, 2023). Notably, Malaysia's allocated environmental expenditure of USD 2.1 billion underscores its commitment to sustainability initiatives, with a budget of USD 10.5 billion, representing 3.2% of GDP, demonstrating a significant financial commitment to drive technological advancement while addressing socio-economic challenges and promoting environmental preservation (World Bank, 2023) (see **Table 2**).

Table 2. Southeast Asian COVID-19 recovery: sustainable technology initiatives.

	Technology Drivers	Socio-Economic Drivers	Sectors	Sustainability Initiatives	Renewable Energy Capacity (MW)	Carbon Emissions (metric tons CO ₂)	Forest Cover (%)	Waste Recycling Rate (%)	Environmental Expenditure (USD billions)	Budget (USD billions)	Budget (% of GDP)
Malaysia	Digitalization initiatives	Upskilling and reskilling	Technology, Education	Renewable energy adoption Environmental conservation, Sustainable agriculture	10,500	250,000	55	20	2.1	10.5	3.2
Singapore	Tech innovation projects	Job creation and retention	Technology, Labor	Green infrastructure, Sustainable urban development	2000	50,000	23	40	1.5	15.2	4.6
Indonesia	E-commerce development	Infrastructure improvement	Technology, Infrastructure	Clean energy transition, Biodiversity conservation	5000	600,000	50	15	1.8	6.8	2.1
Thailand	Smart infrastructure	Tourism revival	Technology, Tourism	Sustainable tourism practices, Green transportation	3000	300,000	30	25	1.9	12.9	4.0
Vietnam	IT infrastructure upgrade	Employment flexibility	Technology, Labor	Circular economy initiatives, Waste management	6000	450,000	40	20	1,2	5.4	1.8

Source: ADB (2023); World Bank (2023).

4.2. Malaysia's trade rebounds

In the second half of 2020, Malaysia's trade activities witnessed improvement, with growth of 4.4% in Q3 and 5.1% in Q4, driven by increased external demand from key trade partners and robust domestic manufacturing activities (MOF, 2024). Manufacturing exports showed significant growth in the last two quarters of 2020, expanding by 6.8% year-on-year in Q3 and further by 7.6% in Q4 (MOF, 2024). The growth in manufacturing exports was mainly propelled by strong performance in the electrical and electronics (E&E) sector, which surged by 16.0% in Q3, along with smaller declines in non-E&E exports (MOF, 2024). The relaxation of Movement Control Order (MCO) restrictions in June 2020 enabled E&E firms to fulfil backlogged orders, underscoring the significant impact of lockdown measures on Malaysia's manufacturing and export activities.

Building on the momentum from 2020, Malaysia's manufacturing sector continued to expand robustly in 2021. The electrical and electronics (E&E) sector reaped the benefits of the global semiconductor boom. This sector experienced a substantial increase in demand, driven by the rapid adoption of digital technologies and the global shift towards remote working and learning. The E&E sector's output grew by 15.5% year-on-year in 2021 as the easing of pandemic-related restrictions enabled firms to address backlogs and ramp up production, with manufacturing overall expanding by 8.5% year-on-year by the end of the year. Trade activities saw significant improvement as global economies reopened and trade flows resumed. Malaysia's total trade increased by 24.9% in 2021, reaching MYR 2.2 trillion (USD 530 billion). Export demand from key partners like China, the United States, and the European Union saw substantial growth. Exports to China, Malaysia's largest trading partner, rose by 27.2%, while exports to the US and EU increased by 18.7% and 19.8%, respectively. The overall export value surged by 25.6% to MYR 1.2 trillion (USD 290 billion), driven by strong performance in manufactured goods, particularly in the E&E sector. While commodity exports remained volatile, there was a gradual recovery in global oil prices and palm oil demand, which provided some relief to this segment of the economy. The average price of Brent crude oil rose from around USD 42 per barrel in 2020 to approximately USD 70 per barrel in 2021, boosting Malaysia's petroleum export revenues. Palm oil exports also saw improvement, with the export value increasing by 25.3% year-on-year, supported by higher global demand and elevated prices. The combined export earnings from crude petroleum and palm oil contributed significantly to the overall trade growth, despite the ongoing challenges in the commodity market.

In 2022, Malaysia saw significant strides in technological advancements, particularly through the adoption of Industry 4.0 technologies. Investments in automation, artificial intelligence (AI), and the Internet of Things (IoT) led to notable enhancements in productivity and competitiveness within the manufacturing sector. The adoption rate of Industry 4.0 technologies among Malaysian manufacturers increased by 35% compared to 2021 and this integration resulted in a 20% increase in production efficiency and a 15% reduction in operational costs. Additionally, AI and IoT applications improved predictive maintenance and quality control processes, contributing to a higher output quality and reducing downtime. New trade agreements

and regional partnerships played a crucial role in boosting Malaysia's trade activities in 2022. The Regional Comprehensive Economic Partnership (RCEP), which came into force in January 2022, was particularly impactful. As the world's largest free-trade agreement, RCEP reduced tariffs and trade barriers between its 15 member countries, including Malaysia. This agreement provided Malaysian exporters with preferential access to new markets, facilitating trade diversification. Malaysia's total trade with RCEP member countries increased by 18% year-on-year, reaching MYR 1.3 trillion (USD 310 billion). Exports to RCEP countries grew by 17.5%, driven by strong demand for Malaysian electronics, machinery, and chemical products. There was a significant shift towards sustainable manufacturing practices in Malaysia in 2022, driven by the global demand for environmentally friendly products. Malaysian manufacturers increasingly adopted green technologies and sustainable practices to align with international environmental standards. The number of companies certified with ISO 14001 (Environmental Management Systems) increased by 30% compared to the previous year. Investments in renewable energy sources, such as solar and biomass, rose by 25%, reflecting a commitment to reducing carbon footprints. The adoption of sustainable practices also included improvements in waste management and energy efficiency, contributing to a 10% reduction in industrial greenhouse gas emissions. In 2022, Malaysia made significant progress in adopting Industry 4.0 technologies, with a 35% increase from 2021, which led to a 20% improvement in production efficiency and a 15% reduction in operational costs. The implementation of the Regional Comprehensive Economic Partnership (RCEP) significantly boosted trade, with total trade with RCEP countries increasing by 18% to MYR 1.3 trillion (USD 310 billion) and exports growing by 17.5%. Sustainability efforts also advanced, as the number of companies certified with ISO 14001 rose by 30%, investments in renewable energy surged by 25%, and industrial greenhouse gas emissions were reduced by 10%. These achievements reflect Malaysia's strides towards technological advancement, enhanced trade relations, and sustainable industrial practices.

In 2023, the global economic landscape was marked by significant uncertainties stemming from geopolitical tensions and fluctuating commodity prices. Conflicts in various regions and trade disputes between major economies contributed to market volatility, impacting global trade flows. Despite these challenges, Malaysia's diversified export base played a crucial role in maintaining trade stability. Malaysia's total trade volume grew by 5% year-on-year, reaching MYR 2.3 trillion (USD 550 billion). The diverse range of export products, including electronics, machinery, chemicals, and palm oil, helped cushion the impact of global economic disruptions, ensuring continued trade performance. The digital economy in Malaysia saw substantial growth in 2023, with e-commerce and digital trade becoming significant contributors to economic development. The Malaysian government's initiatives to support digital transformation, such as the Malaysia Digital Economy Blueprint (MyDIGITAL), facilitated this growth. These efforts included infrastructure development, digital literacy programs, and financial incentives for tech startups and SMEs. As a result, the e-commerce sector expanded by 25%, with total online sales reaching MYR 1 trillion (USD 240 billion). Digital trade, encompassing both goods and services, increased by 22%, driven by the rise of fintech solutions, cloud services, and digital marketing platforms. SMEs benefited from these initiatives, with 60% of

them integrating into the global supply chain through digital platforms, enhancing their market reach and operational efficiency. Efforts to build more resilient supply chains were intensified in 2023, aiming to reduce vulnerabilities exposed by the pandemic. These efforts included localizing certain aspects of production and enhancing logistics infrastructure. Malaysia invested heavily in upgrading its logistics network, with MYR 50 billion (USD 12 billion) allocated to improve port facilities, road networks, and digital logistics solutions. This investment led to a 15% increase in logistics efficiency and a 10% reduction in transportation costs. Additionally, manufacturers adopted a more localized supply chain approach, with 40% of companies increasing their reliance on domestic suppliers. This strategy not only mitigated risks associated with global supply chain disruptions but also supported local industries. The implementation of advanced technologies such as blockchain for supply chain transparency and AI for predictive logistics further strengthened supply chain resilience. In 2023, Malaysia demonstrated remarkable resilience amidst global uncertainties, with total trade volume growing by 5% to MYR 2.3 trillion (USD 550 billion) despite geopolitical tensions and fluctuating commodity prices. The digital economy flourished, with the e-commerce sector expanding by 25% to reach MYR 1 trillion (USD 240 billion) in online sales and digital trade growing by 22%, bolstered by government initiatives like MyDIGITAL. SMEs saw significant benefits, with 60% integrating into the global supply chain through digital platforms. Efforts to enhance supply chain resilience included a 15% improvement in logistics efficiency and a 10% reduction in transportation costs, supported by substantial investments in infrastructure. Additionally, the reliance on domestic suppliers increased by 40%, reducing vulnerabilities and supporting local industries. These measures and growth trends underscore Malaysia's ability to adapt and thrive, securing economic stability and growth through a robust digital economy and resilient supply chains.

In 2024, Malaysia solidified its position as a regional leader in sustainable manufacturing. The country made substantial investments in renewable energy and sustainable technologies, which not only boosted exports but also aligned with global climate goals. Investments in renewable energy projects, including solar, wind, and biomass, increased by 30% year-on-year, totaling MYR 15 billion (USD 3.6 billion). These investments led to a 25% increase in the capacity of renewable energy generation, contributing to a significant reduction in carbon emissions. The export of green technology products and services grew by 20%, reaching MYR 40 billion (USD 9.6 billion), driven by global demand for sustainable solutions. Malaysia's commitment to green growth not only enhanced its export portfolio but also reinforced its reputation as a sustainable manufacturing hub. High-tech exports continued to dominate Malaysia's trade landscape in 2024, with the electrical and electronics (E&E) sector remaining at the forefront. The E&E sector experienced a 12% increase in exports, driven by innovations in semiconductor technologies and advanced electronics. Additionally, other high-tech sectors began to contribute significantly to export growth. The biotechnology sector, focusing on medical research and agricultural biotech, saw a 15% increase in exports, while the pharmaceuticals industry, benefiting from cutting-edge research and development, grew by 18%. Advanced materials, including nanomaterials and smart materials, also showed strong performance, with a 20% rise in export value. These innovative sectors collectively

contributed MYR 250 billion (USD 60 billion) to Malaysia's export earnings, reflecting the country's focus on high-tech and value-added industries. Efforts to diversify Malaysia's economy continued to yield positive results in 2024, reducing dependence on any single sector and fostering balanced growth. The services sector, including finance, tourism, and professional services, showed strong growth, complementing the robust performance of the manufacturing sector. The finance sector expanded by 10%, driven by digital banking and fintech innovations, contributing MYR 150 billion (USD 36 billion) to the economy. Tourism rebounded strongly, with a 20% increase in tourist arrivals and a corresponding 25% rise in tourism revenue, totaling MYR 100 billion (USD 24 billion). Professional services, including IT and business consulting, grew by 15%, adding MYR 80 billion (USD 19 billion) to the GDP. These developments underscored Malaysia's successful economic diversification strategy, ensuring resilience and sustained growth. In 2024, Malaysia strategically focused on sustainable growth, innovation, and economic diversification, yielding impressive results across multiple sectors. Investments in renewable energy surged by 30% to MYR 15 billion (USD 3.6 billion), boosting the capacity of renewable energy generation by 25%. The export of green technology products and services grew by 20% to MYR 40 billion (USD 9.6 billion). High-tech exports, particularly in the electrical and electronics (E&E) sector, increased by 12%, while biotechnology and pharmaceuticals exports rose by 15% and 18%, respectively. Advanced materials exports also saw a significant increase of 20%, contributing to the MYR 250 billion (USD 60 billion) in earnings from high-tech and value-added industries. The finance sector expanded by 10%, adding MYR 150 billion (USD 36 billion) to the economy, while tourism revenue grew by 25% to MYR 100 billion (USD 24 billion). Additionally, professional services grew by 15%, contributing MYR 80 billion (USD 19 billion). These achievements underscore Malaysia's resilience and adaptability, positioning the country for a prosperous and resilient future.

4.3. Technology driven socioeconomic growth in Malaysia

In today's rapidly evolving world, technological advancements have become fundamental drivers of socioeconomic development, reshaping industries, economies, and societies worldwide. Malaysia, as a dynamic and emerging economy, stands at the forefront of leveraging technology to fuel its socioeconomic progress. Technology-driven industries, such as information technology (IT), electronics, and manufacturing, have been key contributors to Malaysia's economic growth. The country's commitment to fostering a conducive environment for technology adoption and innovation has attracted significant foreign direct investment (FDI) and propelled its economic expansion. Technology adoption and innovation play a critical role in enhancing productivity, efficiency, and competitiveness across sectors of the Malaysian economy. The government's initiatives to promote research and development (R&D), entrepreneurship, and technology transfer have spurred innovation and enabled businesses to develop cutting-edge products and services. As a result, Malaysian industries have become more resilient and adaptable to changing market dynamics, driving sustained economic growth and prosperity. The expansion of technology-driven industries has led to the creation of employment opportunities

and the development of a skilled workforce in Malaysia. The growth of sectors such as IT, telecommunications, biotechnology, and renewable energy has generated jobs across various skill levels, from technical specialists to managerial roles. Additionally, the emergence of the digital economy and the gig economy has provided avenues for entrepreneurship and freelance work, empowering individuals to pursue flexible and diverse career paths. Technology plays a crucial role in driving infrastructure development in Malaysia, enabling the country to build robust digital, transportation, energy, and urban infrastructure systems. The government's investments in digital infrastructure, such as high-speed internet connectivity and smart city initiatives, have enhanced connectivity, efficiency, and accessibility to services. Furthermore, advancements in renewable energy technologies have facilitated the transition to sustainable and clean energy sources, reducing reliance on fossil fuels and mitigating environmental impacts. Technology-driven innovations have contributed to social progress and improved the quality of life for Malaysians. In healthcare, telemedicine, electronic medical records, and healthcare analytics have enhanced access to healthcare services and improved patient outcomes. In education, e-learning platforms, digital classrooms, and online resources have expanded access to quality education and lifelong learning opportunities. Furthermore, the integration of green and sustainable finance, along with corporate social responsibility practices, alongside technology-driven initiatives in social services, public safety, and disaster management, has significantly contributed to enhancing community resilience and safety (Popescu and Popescu, 2019).

Technology drivers play a pivotal role in guiding Malaysia's socioeconomic development, driving economic growth, innovation, job creation, infrastructure development, and social progress. As Malaysia continues to embrace technological advancements, it is set to accelerate its socioeconomic transformation and become a globally competitive and sustainable economy. The OECD Due Diligence Guidance for Responsible Business Conduct provides practical advice for companies to implement responsible practices across their operations and supply chains. This guidance helps Malaysian businesses ensure their growth is responsible and inclusive by addressing impacts on human rights, labour, the environment, and anti-corruption. Aligning with these international standards will enhance Malaysia's global competitiveness and ensure its economic growth benefits all segments of society (OECD, 2018). By fostering an ecosystem of innovation, entrepreneurship, and collaboration, Malaysia can leverage technology to address societal challenges, promote inclusive growth, and enhance the well-being of its people as shown in **Table 3**.

Table 3. Technology-driven guide to Malaysia’s socioeconomic development.

Socio Economic Drivers							
	Education	Income Distribution	Employment Opportunities	Infrastructure	Governance	Social Policies	
Technology Drivers	Information and Communication Technology (ICT)	Edu-tech	Tech-inequality	InfoTech Employment	Infostructure	ICT Governance	ICT policies
	Automation	Edu-automation	Automated distribution	Job Automation	Automate structure	Automated Governance	Automation policies
	Renewable Energy Technologies	Edu-renewables	Income-distribution technologies	Renewable Energy jobs	Renew Infratech	Renewable Energy Governance	Renewable Energy policies
	Blockchain	Edu-blockchain	Block ledger	Blockchain Jobs	Blockchain Infra	Blockchain Governance	Blockchain policies
	Artificial Intelligence (AI)	Edu-AI	AI-Income.	AI-Jobs	AI Structure	AI Governance	AI policies
	Internet of Things (IoT)	Edu-IoT	IoT Income	IoT-Jobs	IoT Structure	IoT Governance	IoT policies
	Biotechnology	Edu-biotech	Bio-Income	Biotech-Jobs	Biotech structure	Biotech Governance	Biotech policies
	Fintech	Edu-fintech	Fintech Income	Fintech-Jobs	Fintech structure	Fintech Governance	Fintech policies
	Green Technologies	Edu Green	Green income	Greentech-Jobs	Greentech structure	Greentech Governance	Greentech policies
	Sharing Economy	Edu-sharing	Shared household income	Shared economy opportunities	Shared economy structure	Shared economy Governance	Sharing Economy policies

Source: Created by Sanmugam Annamalah (2024).

5. Discussion

5.1. Malaysia's pandemic management lessons

Malaysia offers valuable lessons to other countries on both successful and unsuccessful pandemic management strategies. For years, scientists have warned of the world's unpreparedness for a pandemic, a concern validated by the COVID-19 crisis with few exceptions. The pandemic has been an extensive stress test for nations' public health systems, public finance, leadership, coordination, the capacity to absorb and act on evolving scientific information, consistency, sustained momentum, and the ability to prioritize future risks despite immediate pressures. These stresses arise from the novel virus's nature and the difficulty our unprepared immune and social systems face in adapting to it. The epidemiological and immunological characteristics of COVID-19, its high infectivity, delayed symptom onset, and severe symptoms make it particularly unforgiving of policy missteps, state capacity shortages, and vaccine inequities. International policy failures, such as global vaccine inequity, have amplified in-country failures, highlighting the interconnectedness of national and global responses.

5.2. Strengthening social safety nets

To support vulnerable individuals and businesses affected by the pandemic, it's essential to expand coverage and eligibility criteria for social assistance programs. Targeted support measures should be introduced for low-income households, informal workers, and MSMEs. Access to affordable healthcare services should be enhanced. Financial literacy and capacity-building programs can empower individuals and businesses to navigate economic challenges effectively and build resilience. Strengthening social safety nets by expanding access to critical assistance for vulnerable groups, reducing inequality, and addressing immediate needs can prevent individuals and businesses from falling into poverty and support their participation in the economy.

5.3. Promote digitalization and innovation

Digitalization and innovation are key drivers of sectoral resilience and competitiveness. Investments in digital infrastructure and connectivity can facilitate remote work, online education, e-commerce, and digital payments, reducing reliance on traditional operations. More incentives and support should be provided for businesses to adopt digital technologies and embrace innovation. Collaboration between industry players, research institutions, and government agencies can identify emerging technologies and best practices, fostering entrepreneurship and startup ecosystems. Promoting digitalization and innovation will enhance sectoral resilience and competitiveness. Businesses that rigorously embrace digital technologies can adapt more readily to changing market conditions, seize growth opportunities, and contribute to economic dynamism and diversification.

5.4. Foster collaboration between the public and private sectors

Public-private partnerships (PPPs) are crucial for co-designing and implementing

sustainable economic recovery strategies. Platforms for dialogue and engagement between government officials, business leaders, civil society organizations, and academia can facilitate the sharing of insights and the co-creation of solutions. Leveraging the expertise, resources, and networks of the private sector can drive innovation, promote inclusive growth, and address systemic barriers. Joint initiatives and campaigns can promote responsible business practices, environmental sustainability, and social inclusion, fostering a conducive business environment that benefits all stakeholders. Fostering collaboration between the public and private sectors facilitates the co-creation of sustainable economic recovery strategies. By leveraging the strengths and resources of both sectors, Malaysia can develop comprehensive and inclusive initiatives that address systemic challenges and promote long-term prosperity.

5.5. Fostering a sustainable economy

In the collective pursuit of a sustainable future, it's imperative to envision an economic framework that not only thrives but also nurtures the planet and society. Each strategy should be designed to not only bolster economic growth but also prioritize environmental preservation and social well-being. By integrating these suggestions into economic practices, society can collectively work towards building a more resilient and sustainable future. Addressing economic needs while simultaneously mitigating environmental impacts and enhancing social equity would lead to sustainable development, long-term economic resilience, and a more inclusive society.

The government must ensure that when tailoring strategies, every aspect of the economic framework contributes to long-term sustainability. By addressing sectoral vulnerabilities and fostering collaboration and innovation, Malaysia can attain a more inclusive and sustainable economic recovery. This involves not only restoring pre-pandemic levels of economic activity but also enhancing resilience to future shocks and ensuring that growth benefits all segments of society.

5.6. Environmental sustainability

Meeting the needs of the present without compromising the ability of future generations involves considering the environmental impacts of economic activities and ensuring that they are within the ecological limits. This might involve addressing issues such as deforestation, pollution, habitat destruction, and biodiversity loss. Implementing effective policies is crucial for promoting environmental sustainability. These policies could include regulations to reduce pollution, incentives for renewable energy adoption, sustainable land use planning, and measures to protect natural habitats and wildlife. Government needs to play a significant role in setting and enforcing such policies, and they need to collaborate with various stakeholders including businesses, NGOs, and local communities. Beyond policies, actual practices on the ground are essential for achieving sustainability goals. This involves adopting eco-friendly technologies, promoting sustainable agriculture and forestry practices, investing in renewable energy, reducing waste, and promoting recycling, and integrating sustainability principles into urban planning and infrastructure

development. The COVID-19 pandemic has brought about various economic and social challenges, but it has also presented an opportunity to rethink and reshape economies in a more sustainable direction. However, there are challenges in balancing economic recovery with environmental protection. There might be pressure to prioritize short-term economic gains over long-term sustainability goals. The pandemic has strained resources and diverted attention away from environmental issues, making it crucial to refocus efforts on sustainability. Despite the challenges, the post-COVID-19 era presents opportunities for Malaysia to transition towards a more sustainable economy. This could involve investing in green technologies and industries, creating green jobs, promoting eco-tourism, and integrating sustainability into economic stimulus packages. By aligning economic recovery efforts with environmental goals, Malaysia can build a more resilient and sustainable economy for the future. Environmental sustainability is a global issue, and international cooperation is essential for addressing it effectively. Malaysia needs to collaborate with other countries on issues such as pandemic mitigation, biodiversity conservation, and sustainable development goals. Participation in international agreements and initiatives can provide Malaysia with access to resources, expertise, and funding to support its sustainability efforts. Developing and implementing policies and practices that prioritize environmental protection, conservation, and sustainable resource management requires a multi-stakeholder approach involving governments, businesses, civil society, and individuals, as well as a recognition of the opportunities presented by the post-pandemic recovery period to build a more sustainable future.

5.7. Social equity & inclusion

Fairness and justice in the distribution of resources, opportunities, and privileges within society would involve addressing inequalities that have been exacerbated by the pandemic. Creating an environment where all individuals and communities feel valued, respected, and supported is crucial to ensure that recovery efforts are inclusive and consider the needs of diverse populations, including ethnic minorities, women, persons with disabilities, and other marginalized groups. This involves actively involving these communities in decision-making processes and ensuring that their voices are heard. As Malaysia works towards economic recovery, it is essential to design policies and programs that target those who have been most affected by the crisis. This may involve providing targeted financial assistance, job training programs, healthcare services, and educational support to vulnerable populations. Economic recovery efforts should prioritize creating opportunities for marginalized communities to participate in and benefit from the economy. This may include initiatives to support small businesses owned by minorities, promoting entrepreneurship among women and youth, and implementing policies to reduce barriers to employment for persons with disabilities and other disadvantaged groups. The pandemic has highlighted existing structural inequities within society, including disparities in access to healthcare, education, housing, and social services. Addressing these structural issues is essential for promoting long-term social equity and inclusion. This may involve reforms to healthcare and education systems, affordable housing initiatives, and measures to reduce discrimination and promote social cohesion. Effective recovery efforts require

active engagement and participation from communities, particularly those that have been historically marginalized or underserved. Empowering communities to take ownership of their development processes can help ensure that recovery efforts are responsive to their needs and priorities. This may involve capacity-building initiatives, community-led development projects, and partnerships between government agencies, civil society organizations, and grassroots community groups. Designing and implementing recovery efforts that address social disparities, promote inclusivity, and prioritize the needs of marginalized communities requires a comprehensive approach that addresses structural inequities, promotes economic opportunities for all, and actively involves communities in the decision-making process. By prioritizing social equity and inclusion in post-pandemic recovery efforts, Malaysia can build a more resilient, cohesive, and sustainable society for the future.

5.8. Economic resilience

The ability of an economy to absorb and recover from pandemics while maintaining its fundamental structure and functions involves strengthening its capacity to withstand future crises. This can be achieved by diversifying revenue streams, reducing dependence on volatile sectors, and implementing risk management strategies. Innovation is key to driving economic growth and competitiveness, particularly in a rapidly changing global landscape. Malaysia can foster innovation by investing in research and development, supporting entrepreneurship and startups, promoting digitalization and technology adoption, and creating an environment conducive to creativity and experimentation. Innovation can lead to the development of new industries, products, and services that contribute to sustainable economic growth. Diversifying the economy and reducing reliance on a few key sectors can enhance resilience by spreading risk and creating alternative sources of income. Malaysia can explore new industries and markets, develop domestic capabilities, and adapt to changing global trends and consumer preferences. This may involve supporting emerging sectors such as renewable energy, biotechnology, sustainable tourism, and advanced manufacturing. Strong institutions are essential for promoting economic resilience and sustainable development. This includes transparent and accountable governance structures, efficient regulatory frameworks, robust financial systems, and effective social safety nets. Strengthening institutions can enhance confidence, stability, and trust in the economy, making it more resilient to external shocks. Collaboration between the public and private sectors, as well as with international partners, can enhance Malaysia's capacity to build a resilient and sustainable economy. Public-private partnerships can mobilize resources, share expertise, and leverage complementary strengths to address common challenges. International cooperation can facilitate knowledge exchange, technology transfer, and access to markets and financing, further supporting Malaysia's economic resilience efforts. Through diversification, adaptation, investment in innovation, strengthening institutions, and fostering collaboration and partnerships, Malaysia can build a more robust, dynamic, and sustainable economy capable of navigating future challenges and uncertainties.

5.9. Health and well-being

Systems, facilities, and resources needed to promote and protect the health of a population, and this includes hospitals, clinics, laboratories, healthcare personnel, and disease surveillance mechanisms. In the post-COVID-19 era, investing in robust public health infrastructure is crucial for detecting and responding to future health threats, improving healthcare delivery, and promoting preventive measures such as campaigns and health education programs. Access to healthcare services is essential for ensuring that all individuals could receive timely and appropriate medical care. Malaysia can promote access to healthcare services by expanding healthcare coverage, reducing barriers to healthcare access (such as geographical, financial, and cultural barriers), and improving the quality and affordability of healthcare services. This may involve enhancing primary care services, strengthening referral systems, and implementing telemedicine initiatives to reach underserved populations. The COVID-19 pandemic has had significant impacts on mental health, including increased stress, anxiety, depression, and social isolation. Prioritizing mental health support is essential for promoting overall well-being and resilience in the post-pandemic era. Malaysia can prioritize mental health support by integrating mental health services into primary care settings, expanding access to counselling and therapy services, raising awareness about mental health issues, and reducing stigma surrounding mental illness. Additionally, investing in community-based mental health programs and providing support for vulnerable populations, such as frontline healthcare workers, can help address the mental health impacts of the pandemic. Addressing health inequities and addressing social determinants of health are also important aspects of promoting health and well-being. This involves recognizing and addressing the underlying social, economic, and environmental factors that influence health outcomes, such as income inequality, education level, housing conditions, and access to healthy food and safe environments. Malaysia can promote health equity by implementing policies and programs that address these social determinants of health, such as poverty alleviation initiatives, education programs, affordable housing policies, and environmental regulations. Enhancing health and well-being requires collaboration and partnerships between government agencies, healthcare providers, civil society organizations, and other stakeholders. By working together, these stakeholders can leverage their respective expertise, resources, and networks to address complex health challenges and promote holistic approaches to health promotion and disease prevention. Constructing a Sustainable Economy in the Post-COVID-19 Era with a focus on health and well-being entails investing in public health infrastructure, promoting access to healthcare services, and prioritizing mental health support to enhance overall well-being. This requires a comprehensive approach that addresses both physical and mental health needs, promotes health equity, and addresses social determinants of health. By prioritizing health and well-being, Malaysia can build a healthier, more resilient, and sustainable society in the post-pandemic era.

5.10. Infrastructure and technology

In the post-COVID-19 era, modernizing infrastructure is essential for supporting economic recovery and promoting sustainable development. This may involve

upgrading transportation networks, building new energy infrastructure, expanding access to clean water and sanitation, and investing in digital infrastructure such as broadband internet connectivity. Modernizing infrastructure and leveraging technology can improve efficiency in various sectors, leading to cost savings, increased productivity, and better resource utilization. Efficiency improvements can also enhance competitiveness and attract investment, driving economic growth. Infrastructure and technology play a crucial role in enhancing connectivity within Malaysia and with the rest of the world. This includes improving transportation networks to facilitate the movement of goods and people, expanding access to high-speed internet and digital communication technologies, and enhancing energy connectivity through interconnections and grid modernization. Enhanced connectivity can spur economic development, foster innovation, and promote social inclusion. Building resilient infrastructure is essential for mitigating the impact of future shocks and disruptions, such as natural disasters, pandemics, or economic crises. Resilient infrastructure is designed to withstand and recover from adverse events while minimizing disruptions to essential services and economic activities. This may involve incorporating pandemic resilient design principles, diversifying energy sources, implementing disaster risk management measures, and investing in backup systems and redundancy. Technology plays a central role in modernizing infrastructure and driving innovation across various sectors. Malaysia can leverage technology to develop smart infrastructure solutions that optimize resource use, improve service delivery, and enhance user experience. This may include deploying sensors and data analytics to monitor and manage infrastructure assets, adopting renewable energy and energy-efficient technologies, and implementing digital platforms for e-governance, e-commerce, and telemedicine. Infrastructure and technology investments should be aligned with the principles of sustainable development, including environmental sustainability, social inclusion, and economic prosperity. This requires considering the long-term impacts of infrastructure projects on the environment, communities, and economy, and integrating sustainability criteria into project planning, design, and implementation. Constructing a Sustainable Economy in the post-COVID-19 Era with a focus on infrastructure and technology entails modernizing infrastructure and leveraging technology to improve efficiency, connectivity, and resilience in various sectors. This requires strategic planning, investment, and collaboration between government, private sector, and civil society stakeholders to build a more sustainable and resilient economy for Malaysia's future.

5.11. Education and skills development

Investing in education and skill development programs to equip individuals with the knowledge and capabilities needed for a rapidly changing world. Investing in education and skills development is crucial and this entails implementing various programs and initiatives aimed at enhancing the knowledge, skills, and capabilities of the workforce to adapt to the evolving demands of the global economy. The government and relevant stakeholders need to allocate resources towards improving the quality and accessibility of education at all levels, from primary to tertiary. This includes investing in infrastructure, curriculum development, teacher training, and

educational technology. Alongside formal education, there should be an emphasis on skill development programs tailored to the needs of different industries and sectors. These programs can include vocational training, apprenticeships, on-the-job training, and retraining initiatives for individuals whose jobs have been impacted by technological advancements or economic shifts. The COVID-19 pandemic has accelerated digital transformation and automation across various industries. Therefore, education and skills development programs must focus on equipping individuals with digital literacy, critical thinking, problem-solving, communication, and adaptability skills. These are essential for navigating the complexities of the modern workplace and seizing opportunities in emerging sectors. In a rapidly evolving economy, learning should be a continuous process. Policies and programs should encourage and facilitate lifelong learning opportunities for individuals of all ages, including adults seeking to upgrade their skills or transition to new careers. This could involve flexible learning pathways, online courses, and incentives for upskilling and reskilling. Collaboration between educational institutions, industry stakeholders, and government agencies is vital to ensure that educational offerings are aligned with current and future labour market demands. This can involve establishing partnerships, advisory boards, and industry-led curriculum development to bridge the gap between education and industry needs. By prioritizing education and skills development, Malaysia can build a more resilient and competitive workforce capable of driving sustainable economic growth in the post-COVID-19 era. This investment not only benefits individuals by enhancing their employability and socioeconomic mobility but also contributes to the overall prosperity and development of the nation.

5.12. Community engagement and participation

In the Post-COVID-19 Era, constructing a sustainable economy in Malaysia requires active community engagement and collaboration across all sectors of society. Empowering local communities to participate in decision-making processes is essential for addressing local needs and promoting sustainable development. Governments, businesses, and other stakeholders should involve communities in developing policies, urban planning, infrastructure projects, and environmental initiatives. By incorporating diverse perspectives, decision-makers can create inclusive and responsive policies that reflect local priorities. Collaboration between different sectors is crucial for tackling complex challenges and achieving sustainable development goals. Governments, non-profit organizations, businesses, academic institutions, and community groups can work together to leverage their resources, expertise, and networks. This collaborative approach enables stakeholders to implement innovative solutions that address economic, social, and environmental issues holistically. Empowering local initiatives is vital for sustainable development. This involves supporting grassroots efforts through funding, technical assistance, capacity building, and networking opportunities. By empowering local organizations and volunteer groups, stakeholders can tap into local knowledge and resources, catalysing bottom-up approaches to development. Promoting civic engagement is also key. Governments and civil society organizations can encourage active citizen participation through public forums, community meetings, consultations, and

participatory budgeting. Engaging citizens in shaping their communities builds trust, accountability, and strengthens democratic governance. Sustainable development requires collective action and shared responsibility. Involving communities in planning, implementing, and monitoring development initiatives fosters a sense of ownership and commitment. This approach leads to more sustainable outcomes, as communities support projects they have helped shape and that align with their values and priorities. By prioritizing community engagement and participation, Malaysia can harness the creativity, expertise, and energy of its citizens to build a more inclusive, resilient, and sustainable economy. This strategy not only empowers communities to shape their futures but also fosters collaboration and solidarity, laying the foundation for long-term prosperity and well-being.

5.13. Disaster risk reduction

In the wake of the COVID-19 pandemic and other challenges, Malaysia must prioritize adaptation and disaster risk reduction to build a sustainable and resilient economy. This involves implementing measures to mitigate the adverse effects of disasters while ensuring robust emergency response systems are in place to manage crises effectively. Malaysia can adopt various risk reduction strategies, such as land-use planning regulations, early warning systems, public awareness campaigns, and ecosystem-based approaches to mitigate the impact of disasters. By reducing exposure and vulnerability to hazards, Malaysia can minimize socioeconomic losses and enhance resilience to future shocks. Despite preventive measures, emergencies and disasters may still occur, making it essential to have strong emergency response systems to manage crises and minimize their impact on communities and the economy. This includes establishing coordination mechanisms, emergency shelters, evacuation plans, search and rescue operations, medical facilities, and communication networks to ensure a timely and coordinated response to disasters. Strengthening emergency response capacity will enhance Malaysia's ability to cope with and recover from disasters, thereby reducing the overall socio-economic impact. Adaptation and disaster risk reduction efforts should align with Malaysia's Sustainable Development Goals (SDGs) to ensure coherence and maximize synergies. Building local capacity and fostering knowledge sharing are essential for effective adaptation and disaster risk reduction. This involves providing training, technical assistance, and financial support to local governments, communities, and relevant stakeholders to enhance their skills and resources for resilience and disaster preparedness. Additionally, promoting collaboration and knowledge exchange between government agencies, research institutions, civil society organizations, and the private sector can facilitate innovation and the dissemination of best practices. By prioritizing adaptation and disaster risk reduction measures, Malaysia can build a more resilient and sustainable economy capable of withstanding the challenges posed by hazards in the post-COVID-19 era. These efforts not only protect lives and livelihoods but also contribute to long-term economic stability, environmental sustainability, and social well-being.

5.14. Governance and policy frameworks

This involves establishing robust governance systems at various levels, including

governmental, institutional, and organizational. Effective governance ensures that decision-making processes are transparent, participatory, and accountable. It also involves the allocation of responsibilities and powers to different entities in a manner that promotes efficiency and responsiveness to societal needs. Malaysia, like many other countries, has committed to achieving the United Nations Sustainable Development Goals (SDGs). This commitment requires developing policies and strategies that address key issues such as poverty, inequality, and environmental degradation. Malaysia can align its policies with the SDGs by developing inclusive and sustainable development strategies. Effective coordination mechanisms are essential to ensure that stakeholders work together towards common goals. This may involve creating platforms for dialogue, forming partnerships, and establishing mechanisms for sharing information and resources. Accountability mechanisms are crucial for ensuring that government officials and other stakeholders are held responsible for their actions and decisions. These mechanisms include transparency, oversight, and public participation in decision-making processes, ensuring that resources are used efficiently and effectively and that policies are implemented for the benefit of society. By establishing transparent, inclusive, and accountable governance structures and aligning policies with the SDGs, Malaysia can lay the foundation for long-term economic and social prosperity.

5.15. International cooperation and solidarity

Malaysia recognizes the importance of collaborating with other nations, international organizations, and regional bodies to tackle shared challenges and pursue common goals. This collaboration involves forming partnerships in areas such as trade, investment, technology transfer, and capacity building. By engaging in global partnerships, Malaysia can leverage the expertise, resources, and experiences of other countries to support its economic development agenda. In the Post-COVID-19 Era, there is an increasing recognition of the need to share knowledge, best practices, and resources to effectively respond to transnational challenges. Malaysia can benefit from exchanging information and expertise with other countries, especially in areas like healthcare, technology, and sustainable development. Facilitating the exchange of knowledge and resources can strengthen Malaysia's capacity to address emerging challenges and seize new opportunities. Solidarity emphasizes unity and collective action in addressing common challenges. In the face of global crises such as the COVID-19 pandemic and climate change, solidarity is essential for fostering resilience and ensuring the well-being of all nations and peoples. Malaysia can play a proactive role in promoting solidarity among countries through diplomatic efforts, humanitarian assistance, and participation in international initiatives aimed at addressing shared challenges. By fostering global partnerships, sharing knowledge and resources, and promoting solidarity, Malaysia can contribute to collective efforts to address transnational challenges and achieve common objectives for the benefit of all. Key characteristics of a sustainable economic model are illustrated in **Figure 2**.

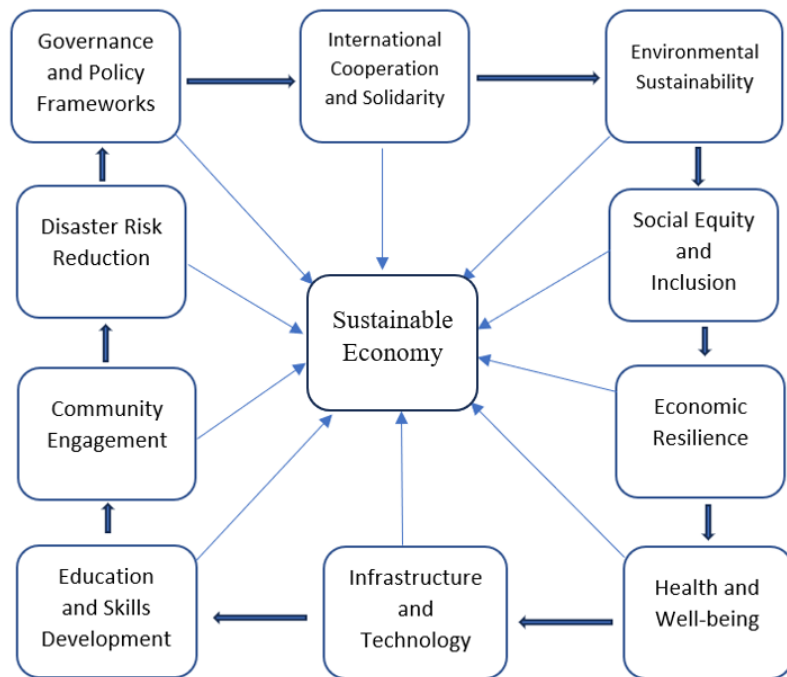


Figure 2. Sustainable economic model.

Source: Created by Sanmugam Annamalah (2024).

5.16. Islamic model: Driving sustainable growth

The Islamic model has emerged as a vital tool for fostering sustainable economic development in countries like Malaysia. With its emphasis on ethics and sustainability, the Islamic model aligns well with the Sustainable Development Goals (SDGs) outlined by the United Nations and offers potential for driving long-term economic growth in the region (Alhammedi, 2024). Different transaction models are closely linked to the sustainability of welfare and institutions. In Malaysia, efforts to enhance societal well-being, such as subsidizing productive businesses, take precedence. In contrast, the institutional sustainability approach prioritizes maximizing shareholder value. A strategic shift of this nature is essential for cultivating an economy resilient to global shocks. Recent developments underscore the potential to bolster economic resilience through diversification and the adoption of sustainable and inclusive models. The Islamic model plays a pivotal role in these efforts, offering a pathway to more stable and equitable economic growth by providing a robust framework for mitigating the impacts of global crises (Alhammedi, 2024). Through such strategies, Malaysia not only prepares itself to address future challenges but also aligns with the global trend toward economic sustainability and inclusivity. This proactive approach to economic stability, particularly through the adoption of the Islamic economic model, is significant when evaluating the status of GCC economies, especially in light of the post-COVID-19 pandemic impact.

5.17. Global vs. Malaysian economic recovery

Many advanced economies, such as the United States, Germany, and South Korea, have focused on accelerating digital transformation and adopting Industry 4.0 technologies to boost productivity, innovation, and resilience in sectors like manufacturing and services. Countries like Sweden, the Netherlands, and Germany

have prioritized green growth through investments in renewable energy and sustainable technologies, part of broader efforts to transition to more sustainable economic models. The pandemic highlighted vulnerabilities in global supply chains, prompting countries such as Japan, Australia, and India to enhance supply chain resilience via localization, diversification of supply sources, and improvements in logistics infrastructure. To mitigate risks from over-reliance on specific sectors, economies have pursued diversification; for example, oil-dependent economies in the Middle East have invested in non-oil sectors like tourism, finance, and technology. Globally, there has been a push to support SMEs through digital transformation, financial incentives, and infrastructure development, crucial for integrating SMEs into global supply chains and fostering inclusive economic growth. Malaysia's recovery strategy aligns with these global trends while reflecting its unique economic context and priorities. Malaysia has significantly adopted Industry 4.0 technologies, with a 35% increase in adoption from 2021 to 2022, leading to a 20% improvement in production efficiency and a 15% reduction in operational costs, similar to trends in advanced economies. Malaysia has positioned itself as a regional leader in sustainable manufacturing, with a 30% increase in renewable energy investments in 2024 and a 25% boost in renewable energy generation capacity. The export of green technology products grew by 20%, aligning Malaysia with global sustainability goals pursued by countries like Sweden and Germany. Malaysia has also focused on building resilient supply chains, improving logistics efficiency by 15%, and reducing transportation costs by 10%. These efforts mirror those of Japan and Australia, emphasizing localization and infrastructure enhancements to mitigate global disruptions. Malaysia continues to diversify its economy, reducing dependence on single sectors. The services sector, including finance and tourism, has shown strong growth, complementing the robust manufacturing sector. This diversification strategy is similar to efforts in economies like the UAE, which are shifting focus from oil to more varied economic activities. The digital economy in Malaysia has grown significantly, with e-commerce expanding by 25% and digital trade by 22%. Government initiatives have helped 60% of SMEs integrate into the global supply chain through digital platforms, similar to digital transformation support seen in the European Union and China. Both globally and in Malaysia, technological advancements have driven economic recovery. Malaysia's focus on Industry 4.0 technologies has been particularly crucial in enhancing its manufacturing sector's productivity and competitiveness. Malaysia's commitment to green growth and renewable energy investments mirrors global trends and highlights its regional leadership in sustainable manufacturing. While advanced economies lead in sustainability, Malaysia's progress is notable within the ASEAN context. The global emphasis on supply chain resilience is reflected in Malaysia's efforts to localize production and improve logistics infrastructure, with improvements in logistics efficiency and cost reductions on par with strategies seen in Japan and Australia. Economic diversification is a common strategy globally and in Malaysia. While global examples often involve transitioning away from single commodities like oil, Malaysia's diversification includes strengthening its services sector alongside manufacturing. Both Malaysia and global economies recognize the importance of digital transformation for SMEs. Malaysia's significant growth in e-commerce and digital trade aligns with global efforts to

integrate SMEs into the broader economy through digital means. Overall, Malaysia's recovery strategies align closely with global trends, emphasizing technological advancement, sustainability, supply chain resilience, economic diversification, and digital transformation. These strategies have positioned Malaysia well within the global discourse on economic recovery, showcasing its adaptability and resilience in a rapidly changing economic landscape.

5.18. Integrating economic models for sustainability in Malaysia

In the wake of the pandemic, resilience planning is crucial for all economic models. By incorporating resilience measures into recovery plans, Malaysia can better withstand future shocks and crises. This includes adopting circular principles to reduce waste, promoting green investments for environmental sustainability, and fostering partnerships for inclusive growth. Green stimulus packages, central to the Green Economy model, stimulate economic growth by allocating resources towards renewable energy, sustainable infrastructure, and green technology development, creating jobs and reducing carbon emissions. Digital transformation is key to Malaysia's recovery, driving innovation and competitiveness in the knowledge-based economy, enabling efficient resource management in the Circular Economy, and supporting remote work and e-commerce. Capacity building ensures Malaysia's workforce is prepared for emerging industries and technologies through education and training, fostering innovation and entrepreneurship. Partnerships and collaboration are vital across all economic models. In the Circular Economy, they facilitate a closed-loop system, while in the Blue Economy, they promote sustainable marine resource management. Cross-sectoral collaborations drive innovation and knowledge-sharing. By integrating resilience planning, green stimulus packages, digital transformation, capacity building, and partnerships into its recovery strategy, Malaysia can build back better, fostering sustainable growth, environmental stewardship, and social well-being in the post-pandemic era.

6. Conclusion

In the aftermath of the COVID-19 pandemic, Malaysia stands at a critical juncture in its economic recovery journey. Addressing the multifaceted challenges and seizing emerging opportunities requires a holistic and collaborative approach that integrates diverse perspectives, data-driven insights, and evidence-based policymaking. Through comprehensive analysis, scenario planning, stakeholder engagement, and targeted support measures, Malaysia can construct a sustainable economic framework that fosters resilience, inclusivity, and innovation. The Malaysian Dilemma presents a complex challenge that demands a nuanced understanding of the socio-economic landscape and a proactive response to emerging trends. By leveraging data-driven insights, policymakers can navigate the intricacies of the nation's economic dynamics and identify areas for intervention to foster recovery and sustainable growth. Through scenario planning, Malaysia can anticipate future challenges and opportunities, enabling strategic decision-making and adaptive capacity building. By learning from past experiences, embracing innovation, and fostering collaboration, Malaysia can navigate through uncertainties and emerge

stronger from the challenges posed by the pandemic. With a resilient and inclusive economic framework in place, Malaysia is well-positioned to build a brighter and more prosperous future for its people.

Recommendations for future study

Considering the profound impact of the COVID-19 pandemic on the Malaysian economy and policies, there is an urgent need to thoroughly investigate its pro-COVID policy effects. While encountering certain challenges, research on COVID-19 has the potential to uncover valuable insights, stimulating innovation and experimentation in the realms of AI and Industrial Revolution 4.0 and 5.0. Amidst the COVID-19 crisis, it is crucial to examine the underlying assumptions in current research independently. This study aims to offer a comprehensive roadmap by elucidating the literature connecting the COVID-19 pandemic to widespread economic harm, thus guiding future research in this emerging field. Collaboration between researchers and policymakers is essential for advancing COVID-19 research and formulating effective strategies to address both present and future challenges. Given the multifaceted repercussions of COVID-19 on economic, health, and societal fronts, navigating these subjects demands sensitivity and nuance. This study seeks to highlight the critical concerns and complexities associated with COVID-19, aiding scholars and policymakers in understanding its impact on the Malaysian economy. It is imperative to investigate how the pandemic has influenced consumer behaviour, supply chains, and labour markets among Generation Y and Z, while also assessing the effectiveness of various government policy responses. By addressing these key aspects, we can develop a deeper understanding of the pandemic's wide-ranging effects and devise strategies to mitigate its impact on the Malaysian economy.

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