

**MALAYSIA'S  
NATIONAL REGULATORY SANDBOX (NRS)  
CASE STUDIES:**

THE ONLINE HEALTHCARE SERVICES (OHS) REGLAB AND  
THE MALAYSIA AUTONOMOUS VEHICLE (MYAV)

# ACKNOWLEDGEMENT

This research report, *“Malaysia’s National Regulatory Sandbox (NRS) Case Studies: The Online Healthcare Services (OHS) RegLab and The Malaysia Autonomous Vehicle (MYAV),”* is the result of a strategic collaboration between Futurise and Universiti Teknologi MARA (UiTM). We extend our profound gratitude to the leadership and team at Futurise, under the Ministry of Finance, for their invaluable strategic guidance, critical data, and unwavering commitment to advancing the NRS initiative. Sincere appreciation to UiTM for its indispensable academic rigour, research infrastructure, and intellectual contributions, which provided a robust foundation for this industry study.

We extend our sincere appreciation to all industry participants, policymakers, CEOs, and technology innovators, for generously sharing their time, experiences, and insights during in-depth interviews. Their perspectives were crucial in establishing a robust empirical foundation for evaluating the NRS’s socio-economic impact. Finally, we acknowledge the dedicated efforts of the Futurise-UiTM collaboration, whose seamless coordination and commitment to bridging theory with practice were instrumental to this project’s success. This partnership stands as a testament to the power of public-private academic collaboration in driving Malaysia towards a sustainable, inclusive, and innovative future economy.

*Together, we innovate towards a resilient and inclusive future economy for Malaysia.*

**Futurise Sdn. Bhd. | Universiti Teknologi MARA (UiTM)  
2025**

# ACTING CEO FOREWORD



**Shafinaz Salim**  
Acting Chief Executive Officer

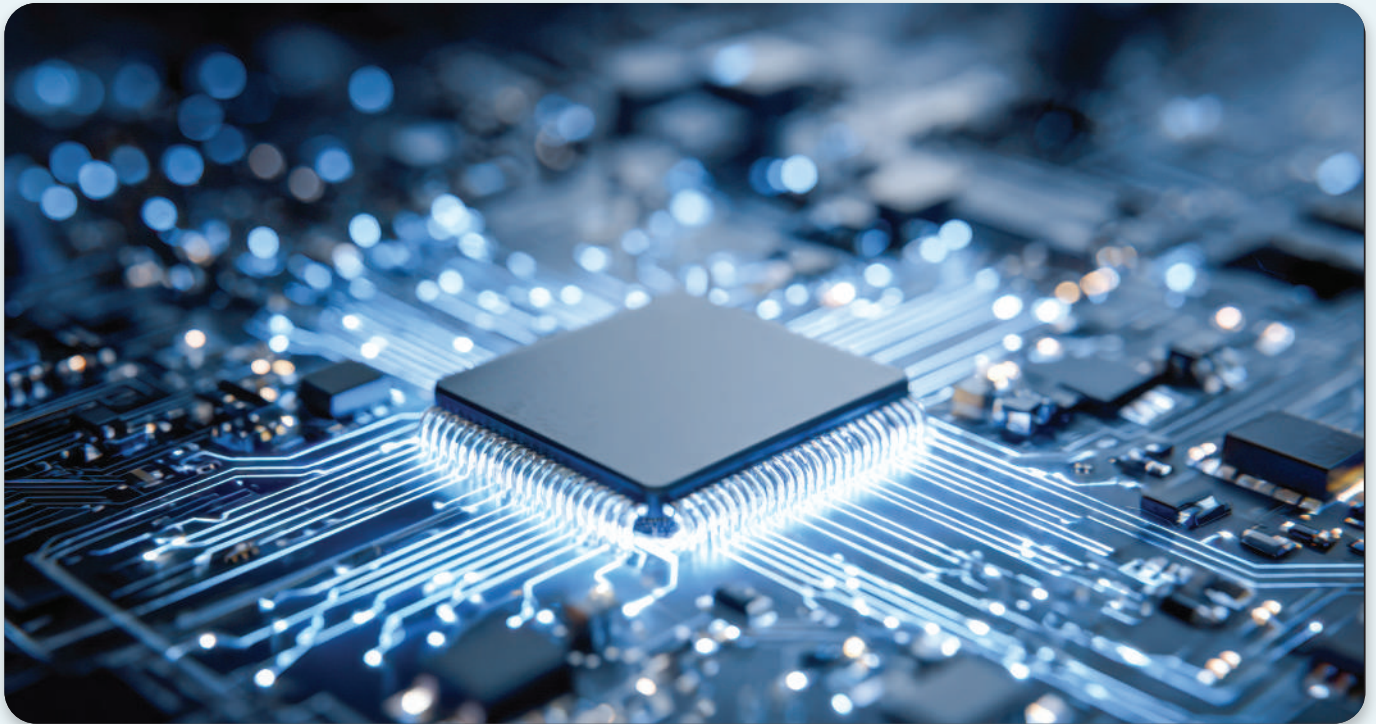
This research report presents a comprehensive case studies analysis of the National Regulatory Sandbox (NRS) in Malaysia. Since its inception, the NRS has served as a dynamic platform that supports the testing, validation, and commercialisation of non-financial innovations, particularly those involving future-ready technologies across both the private and public sectors.

Over the years, the NRS has contributed to the growth of numerous innovation projects, ranging from early-stage prototypes and testing phases to promising commercial entities with significant market potential. This report outlines the studies' key objectives: assessing socio-economic outcomes, evaluating innovation performance, and identifying synergies between academia, industry, and government. The insights gained will guide the refinement of the NRS operational framework, promote greater inclusivity, and strengthen support mechanisms for local innovators.

Sincere appreciation is extended to the research team for their commitment to producing rigorous and high-quality empirical work, as well as to our strategic partners for contributing valuable perspectives through the OHS RegLab and MyAV case studies. The continued collaboration of government agencies, industry players, and the wider innovation ecosystem has enabled the NRS to become a strong model of multi-stakeholder partnership.

It is hoped that the findings in this report will contribute meaningfully to Malaysia's innovation policy landscape and reinforce Futurise's mission to drive the nation's future-focused economic transformation. With sustained collaboration and openness, Malaysia is well positioned to advance its aspiration of becoming a global leader in innovation.

# EXECUTIVE SUMMARY



Malaysia's National Regulatory Sandbox (NRS), led by Futurise, represents a strategic pivot from rigid, top-down regulation to a collaborative, agile governance model, positioning the nation to lead the global innovation economy. By creating controlled, real-world testing environments with temporary regulatory flexibility endorsed by the relevant regulators, the NRS accelerates the safe deployment of technologies & business model which disrupt current regulations while proactively informing evidence-based regulations. This report demonstrates the framework's efficacy through two flagship initiatives: the Online Healthcare Services Regulatory Lab (OHS RegLab), which established vital guidelines for online healthcare services, and the Malaysia Autonomous Vehicle (MyAV) Sandbox, which is developing the safety protocols for autonomous mobility. These case studies highlight the NRS's role in fostering cross-ministerial collaboration, attracting substantial investment, and driving the creation of high-tech jobs, thereby directly supporting national blueprints such as RMK-13.

The socio-economic impact of the NRS is both measurable and transformative. Ultimately, the NRS is more than a testing mechanism; it is a strategic instrument for nation-building, fostering public trust, enhancing regulatory competitiveness, and solidifying Malaysia's position as a regional hub for responsible technological innovation.

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# ABBREVIATION

TERMS	DEFINITION
<b>4IR</b>	Fourth Industrial Revolution
<b>AAM</b>	Advanced Air Mobility
<b>ADS</b>	Automated Driving System
<b>AI</b>	Artificial Intelligence
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>AV</b>	Autonomous Vehicle
<b>AVES</b>	Autonomous Vehicle Engineering and Safety (Research Group)
<b>B40</b>	Bottom 40% (Low-Income Households)
<b>BRT</b>	Bus Rapid Transit
<b>CAAM</b>	Civil Aviation Authority of Malaysia
<b>DOSM</b>	Department of Statistics Malaysia
<b>DTZ</b>	Drone Testing Zone
<b>EEV</b>	Energy Efficient Vehicle
<b>e-KYC</b>	electronic Know Your Customer
<b>EMR</b>	Electronic Medical Record
<b>ESG</b>	Environmental, Social, and Governance

TERMS	DEFINITION
<b>eVTOL</b>	electric Vertical Take-Off and Landing
<b>FDI</b>	Foreign Direct Investment
<b>Futurise</b>	Futurise Sdn Bhd
<b>GDP</b>	Gross Domestic Product
<b>IDI</b>	In-Depth Interview
<b>IoT</b>	Internet of Things
<b>IoV</b>	Internet of Vehicles
<b>JPJ</b>	Road Transport Department (Jabatan Pengangkutan Jalan)
<b>JPDP</b>	Jabatan Perlindungan Data Peribadi (Department of Personal Data Protection)
<b>JKR</b>	Public Works Department (Jabatan Kerja Raya)
<b>MaaS</b>	Mobility-as-a-Service
<b>MARii</b>	Malaysia Automotive, Robotics and IoT Institute
<b>MIGHT</b>	Malaysian Industry-Government Group for High Technology
<b>MIROS</b>	Malaysian Institute of Road Safety Research
<b>MoH</b>	Ministry of Health
<b>MOT</b>	Ministry of Transport
<b>MP</b>	Malaysia Plan
<b>MRFR</b>	Market Research Future

TERMS	DEFINITION
<b>MSME</b>	Micro, Small and Medium-sized Enterprise
<b>MyAV</b>	Malaysia Autonomous Vehicle
<b>MyDIGITAL</b>	(Malaysia's national digital economy initiative)
<b>MyRAP</b>	Malaysian Road Assessment Program
<b>NAIO</b>	National Artificial Intelligence Office
<b>NAP</b>	National Automotive Policy
<b>NRS</b>	National Regulatory Sandbox
<b>NTIS</b>	National Technology and Innovation Sandbox
<b>NxGV</b>	Next-Generation Vehicle
<b>OHS RegLab</b>	Online Healthcare Services Regulatory Lab
<b>PDPA</b>	Personal Data Protection Act 2010 (Act 709)
<b>R&amp;D</b>	Research and Development
<b>RegTech</b>	Regulatory Technology
<b>RMK-12</b>	Rancangan Malaysia Ke-12 (Twelfth Malaysia Plan)
<b>RMK-13</b>	Rancangan Malaysia Ke-13 (Thirteenth Malaysia Plan)
<b>SLA</b>	Service Level Agreement
<b>STEM</b>	Science, Technology, Engineering, and Mathematics
<b>UiTM</b>	Universiti Teknologi MARA

TERMS	DEFINITION
<b>UKM</b>	Universiti Kebangsaan Malaysia
<b>UNECE</b>	United Nations Economic Commission for Europe
<b>UTM</b>	Universiti Teknologi Malaysia
<b>V2X</b>	Vehicle-to-Everything
<b>VTA</b>	Vehicle Type Approval



**SECTION I:  
POSITIONING FUTURISE AND  
NRS IN MALAYSIA'S INNOVATION  
ECONOMY**



This research report analyses the socio-economic impact of Malaysia's National Regulatory Sandbox (NRS) by examining two flagship initiatives that demonstrate the country's proactive approach to governing disruptive industry innovations the Online Healthcare Services (OHS) RegLab and the Malaysia Autonomous Vehicle (MyAV) Sandbox. These case studies indicate how regulatory experimentation drives policy innovation, enabling responsive and agile frameworks that align with Malaysia's ambition for a resilient, inclusive, and digitally driven economy.

The OHS RegLab emerged as a targeted response to critical regulatory gaps in Malaysia's digital healthcare sector. The COVID-19 pandemic underscored the urgency of reform, as online-medical consultation use increased by more than 200%<sup>1</sup>, exposing systemic risks in using such platforms. Through this sandbox, regulators and healthcare innovators collaborated to align policies while prioritising quality patient-doctor interaction<sup>1</sup>. The initiative strengthened oversight mechanisms and enhanced data governance and privacy compliance. By fostering collaboration among regulators, service providers, and policymakers, the OHS RegLab ensured that digital healthcare in Malaysia remains accessible, accountable, and secure.

In parallel, the Malaysia Autonomous Vehicle (MyAV) Sandbox marked a strategic step toward next-generation mobility for Malaysia. It created a structured environment for phased testing of autonomous vehicles (AVs) on public roads, supported by five designated test routes across key urban and suburban areas that simulate diverse driving conditions. This initiative fostered strong coordination among enforcement authorities, technology developers, and municipal councils to ensure the safe and responsible deployment of AV technologies.

MyAV strengthened road safety, enhanced policy readiness, and increased public confidence in driverless transport solutions. It also established the foundation for the My Autonomous Vehicle Guideline 6.0, which now serves as a national framework supporting Malaysia's goals for smart city integration and low-carbon, sustainable transportation systems.

Collectively, these case studies demonstrate how the NRS functions as a national mechanism for regulatory experimentation. It enables real-world testing of emerging technologies and disruptive industry innovations while maintaining robust safeguards for the public interest. The OHS RegLab and MyAV are not merely technical pilot projects; they are initial regulation guidelines that set out in redefining sectoral governance and help mature Malaysia's digital and innovation ecosystems.

By leveraging adaptive, cross-sectoral collaboration to address regulatory gaps, the NRS accelerates policy development cycles, enhances public trust, and increases investor confidence. These outcomes strengthen Malaysia's position as a regional leader in regulation innovation. This report concludes by presenting strategic recommendations to further enhance the NRS framework. These recommendations emphasise building institutional capacity, conducting ongoing impact evaluations, and pursuing inclusive stakeholder engagement to ensure the sandbox model continues to accelerate innovation, competitiveness, and socio-economic resilience in a rapidly evolving technological landscape.

<sup>1</sup> Maria Patricia González, Carlos Scartascini, Increasing the use of telemedicine: A field experiment, PNAS Nexus, Volume 3, Issue 7, July 2024, pgae239, <https://doi.org/10.1093/pnasnexus/pgae239>

# 1.1 The National Regulatory Sandbox (NRS) as a Catalyst for Malaysia's Innovation Economy



The NRS is an initiative that enables innovators to test new products, services, and business models in a controlled regulatory setting. Since its inception in 2018 under the Ministry of Finance, Futurise has administered the NRS to provide regulation testing and create structured environments for experimentation. This approach represents a shift from rigid, regulation to collaborative, adaptive governance, reflecting global trends in regulatory innovation. By fostering cross-sector collaboration among regulators, industries, academia, and entrepreneurs, the NRS reduces bureaucratic inertia, lowers market entry barriers, and accelerates the adoption of innovation.

As Malaysia's digital economy is projected to contribute 22.6% to GDP by the end of 2025<sup>2</sup>, this regulatory agility has become vital for maintaining competitiveness and promoting inclusive technological progress. <sup>3</sup>Futurise connects policy with real-world application through evidence-based regulatory testing. The NRS enables rapid responses to evolving technological and market challenges, fostering a regulatory ecosystem that promotes innovation while protecting public interest and consumer trust.

Since its launch, the NRS has guided policy innovation across key strategic sectors, including healthcare, Artificial Intelligence (AI), mobility, and data governance. These initiatives align with Malaysia's key policy framework which is the Thirteenth Malaysia Plan (2026-2030) and other relevant policies. According to the Futurise Impact Report 2024, the agency's work has yielded five national regulatory guidelines. It has strengthened the Personal Data Protection Act 2010 in collaboration with the Department of Personal Data Protection (JPDP).

Futurise's 2024 achievements, documented in its Impact Report, include two major industry studies, 14 public engagement initiatives, and four RegTalk forums. Through collaboration across 18 ministries and 50 partners, Futurise has delivered 43 regulatory innovations, such as the Personal Data Protection guidelines, MicroMobility Service Operator Guidelines and furthermore, Malaysia's cultural and mobility sectors are also experiencing innovation-led policy development. The updated PUSPAL Guidelines 6.0, jointly introduced by the Ministry of Communications and Digital Malaysia and the Ministry of Tourism, Arts and Culture Malaysia, aim to streamline the entertainment and events ecosystem, including film, live performance, and filming permits<sup>3</sup>. Meanwhile, the National AI Office reports that generative AI technologies could unlock up to USD 113.4 billion in productive capacity for Malaysia, underscoring AI's broad potential to drive social and economic transformation<sup>4</sup>. Looking

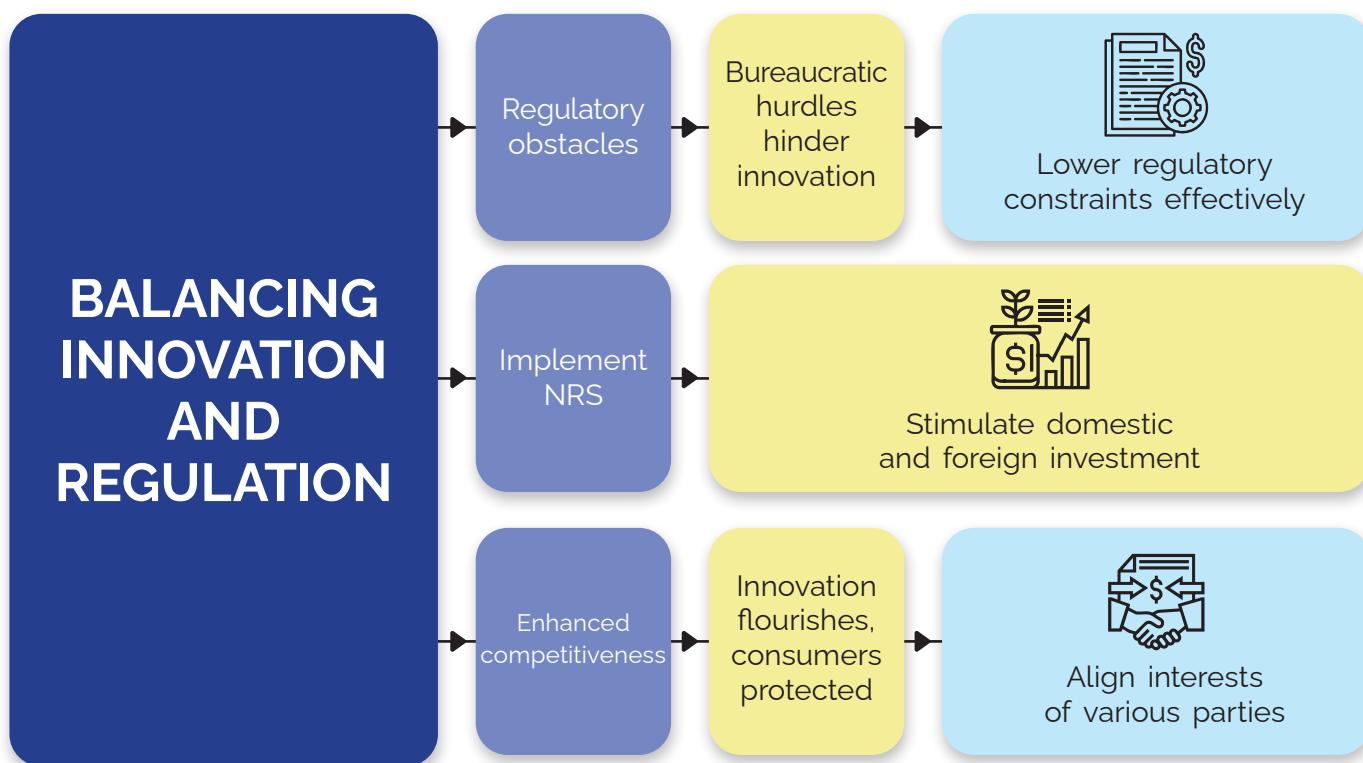
<sup>2</sup> MRANTI Corporation Sdn Bhd. (2022, May 19). Malaysia's digital economy to contribute 22.6% to GDP, create half a million jobs by 2025

<sup>3</sup> Fahmi: New Puspal guidelines introduced to streamline event-management and elevate Malaysia's entertainment sector. MalayMail, 18 April 2025.

<sup>4</sup> The Economic Impact of Generative AI: The Future of Work in Malaysia. National AI Office. (2023)

ahead, Futurise continues to strengthen Malaysia's leadership in agile governance. As the secretariat appointed by CAAM to serve as the Secretariat for the Advanced Air Mobility (AAM) Steering Committee, it is accelerating the integration of eVTOL aircraft and drone logistics. Empirical evidence indicates that the Malaysian Research Accelerator for Technology and Innovation (MRANTI) projects Malaysia's drone-technology industry could contribute approximately RM 50.71 billion to the national GDP and create around 100,000 jobs by 2030<sup>5</sup>.

In Malaysia's Artificial Intelligence (AI) sector, the market is rapidly expanding, driven by strong national initiatives that promote AI adoption across various industries. According to the Malaysia Internet of Things Association (2023), the country is expected to generate approximately 500,000 AI-based jobs across various sectors within the next six years. Complementing this, TalentCorp (2023) estimates that the broader digitalisation and green economy transformation may affect up to 620,000 jobs nationwide by 2030, signalling a significant restructuring of Malaysia's job market landscape.



Meanwhile, Futurise's work on micromobility supports urban sustainability by formalising operational standards for micromobility operators and their last-mile connectivity solutions. According to a study titled "Unlocking the Potential of Micromobility in Malaysia", the main player of shared micromobility operators achieved approximately RM13.9million revenue in 2021 from the e-scooter rental business. This expansion is driven by the increasing integration of micromobility solutions such as e-scooters, e-bikes, and shared mobility platforms with public transportation systems and urban sustainability initiatives.

The trend reflects Malaysia's broader shift toward smart city development and the adoption of green, last-mile transport solutions that support both economic efficiency and environmental goals.

<sup>5</sup> Business Today Editorial. (2023, January 21). MRANTI propels Malaysia's drone technology to catalyse emerging technology innovations. Business Today.

## 1.2 Policy Alignment: RMK-13



The alignment of the NRS policy with MyDIGITAL: Malaysia's Digital Economy Plan 2021-2030 creates strategic coherence in the country's digital transformation. The NRS serves as a key catalyst to achieve the plan's target of a 22.6% GDP contribution from the digital economy and the creation of 500,000 highly skilled jobs by 2025<sup>7</sup>.

The NRS directly advances these aspirations by institutionalising testing mechanisms for new technologies, such as Autonomous Vehicles (AVs) and Advanced Air Mobility (AAM), which drive innovation across transportation, digital health, and IoT infrastructure. This framework gained further reinforcement with the establishment of the National Artificial Intelligence Office (NAIO) under MyDIGITAL Corporation in 2024, which aligns national AI R&D initiatives with the principles of responsible innovation<sup>8</sup>.

In addition, the integration of this regulatory sandbox approach resonates with the priorities of the Thirteenth Malaysia Plan (RMK-13), which emphasises human capital development and enhancing industry competitiveness in the digital economy era.

Futurise is leveraging the 13th Malaysia Plan's allocation for 4IR infrastructure by developing a Drone Testing Zone (DTZ) and an autonomous vehicle route in Cyberjaya. This testbed will accelerate the development of smart city technologies. The program gains further support from fiscal incentives, including a double tax deduction for research and development (R&D) outlined in the 2025 Budget, which are designed to attract high-tech sector investments.

<sup>6</sup> Business Today. (2021, June 1). Futurise's impact report highlights over 4,000 job creations within NRS Labs. Business Today.

<sup>7</sup> Prime Minister's Office of Malaysia. (2021, February 19). MyDIGITAL expected to create 500,000 jobs, contribute 22.6% to GDP by 2025. Bernama.

<sup>8</sup> MyDIGITAL Corporation. (2024, August 28). Malaysia launches National AI Office (NAIO) [Press release].

<sup>9</sup> The Twelfth Malaysia Plan (12MP) 2021-2025 includes key strategies to gear up for the Fourth Industrial Revolution (4IR), including the creation of 4IR innovation parks and expansion of the regulatory sandbox beyond fintech.

The NRS's strategic relevance is further amplified by its alignment with the newly launched Thirteenth Malaysia Plan (RMK-13), which sets the national development agenda for 2026-2030. RMK-13 aims to navigate Malaysia through significant global and domestic challenges, including geopolitical tensions, technological disruptions, and an ageing population (EPU, 2024). The plan's focus on "Redefining Development" directly supports the NRS's mandate through several key strategic priorities:

**1**  
Technological and Digital Evolution

RMK-13 explicitly addresses the need to close the technology gap between Malaysia and developed nations by investing heavily in research, innovation, and digital infrastructure (EPU, 2024). The NRS operationalises this goal by providing the crucial regulatory framework for testing and adopting emerging technologies, such as AI and autonomous systems, which the plan highlights as critical growth areas.

**2**  
Digital Public Infrastructure and AI

A cornerstone of RMK-13 empowers the Ministry of Digital to intensify initiatives such as the National AI Office, National Data Bank, and digital twin technology (Ministry of Digital, 2024). Foundational initiatives, such as MyDigital ID, are poised to integrate with NRS projects, potentially streamlining secure identity verification for services within the OHS RegLab. Furthermore, establishing a National Data Commission will create a structured environment for data-driven NRS initiatives to thrive securely and ethically.

**3**  
Addressing Demographic Shifts

RMK-13 introduces a landmark National Ageing Blueprint to address the needs of Malaysia's rapidly ageing population, which projections indicate will see 20% of citizens over 65 by 2044 (DOSM, 2023; EPU, 2024). The OHS RegLab directly supports this objective by enhancing healthcare accessibility for older populations and rural communities through telemedicine, thereby aligning with the plan's focus on quality of life and social inclusion.

**4**  
Talent Development and Retention

RMK-13 acknowledges the critical challenge of talent constraints and "brain drain" (EPU, 2024; World Bank, 2023). The NRS, particularly through initiatives such as the MyAV sandbox, aims to foster high-skilled job creation and talent development in cutting-edge fields, directly supporting the plan's goal of building a future-ready workforce. Its strategic priorities include enhancing economic complexity through advanced technology and digitalisation, while strengthening social mobility and governance to support frameworks like the NRS that facilitate innovation in critical sectors.


10 Economic Planning Unit. (2025). The Thirteenth Malaysia Plan (RMK-13) 2026-2030: Melakar Semula Pembangunan [Executive Summary]. Prime Minister's Department, Malaysia.


POLICY	STRATEGIC FOCUS	ROLE OF THE NRS	SCOPE AND TARGET
RMK-13	Tech-led growth, demographic resilience, and digital governance <sup>5-9</sup> .	Providing agile regulatory frameworks for RMK-13 priorities like AI, digital health, and smart mobility.	Targets 95% of federal services online by 2030 and positions Malaysia as a regional digital leader <sup>3</sup> .

The NRS's alignment in advancing Malaysia's ambition to enhance economic complexity, cultivate high-value jobs, and establish new or deepen existing industry clusters. By aligning with these national priorities, the NRS helps support Malaysia's emerging focus on sectors such as IoT and AI, positioning the country to attract investment and accelerate innovation across its technology ecosystem. <sup>11</sup>The NRS provides the dynamic regulatory framework needed to test related innovations, including drone delivery and other digital systems solutions.

<sup>11</sup> Ministry of Investment, Trade and Industry. (2023). National Investment Aspirations: Driving Malaysia's long-term goals.





**SECTION II: **  
**RESEARCH APPROACH FOR THE  
ONLINE HEALTHCARE SERVICES  
(OHS) REGULATORY LAB AND  
MALAYSIA AUTONOMOUS VEHICLE  
(MyAV)**



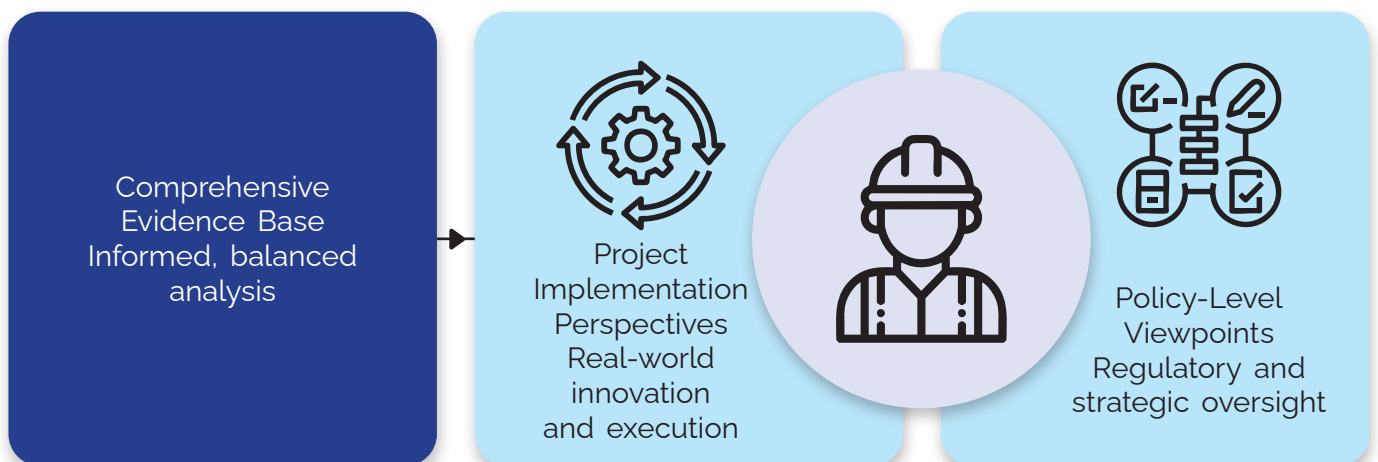
## 2.1 Research Design: Case-Based Qualitative Assessment



This report employs a case-based qualitative design to examine the socio-economic implications of Malaysia's NRS, with a specific focus on the Online Healthcare Services (OHS) Regulatory Lab and the Malaysia Autonomous Vehicle (MyAV) initiative. These two cases were selected to illustrate sandbox applications in two distinct domains: digital health service innovation and next-generation mobility.

The research report adopts a descriptive and comparative approach, examining how temporary regulatory flexibility endorsed by relevant regulators, multi-agency coordination, and institutional readiness influence measurable outcomes such as economic growth, service accessibility, and social adaptation grounded not in abstract generalisations but in field-based evidence from regulators, industry participants, and end-users, thereby aligning the methodology with national policy evaluation frameworks<sup>12</sup>.

### Bridging Implementation and Policy Perspectives



## 2.2 Sampling Strategy: Purposive and Expert-Driven

This research adopts a purposive and expert sampling strategy to ensure that the data collected is both relevant and authoritative. Given the specialised and high-impact nature of the sandbox cases, purposive and expert sampling was applied to ensure data relevance and depth.

Informants were chosen for their direct operational or regulatory engagement with the OHS RegLab and MyAV ecosystems. This sample balances project implementation perspectives with policy-level viewpoints, generating a comprehensive evidence base for analysis.

<sup>12</sup> Organisation for Economic Co-operation and Development. (2020). The role of sandboxes in promoting flexibility and innovation in the digital age. OECD Publishing.

## 2.3 Qualitative Instruments: Semi-Structured Interviews and Policy Document Analysis



Two complementary instruments were employed. First, semi-structured interviews with company founders, regulators, and project leads involved in OHS RegLab and MyAV. These discussions explored participant experiences, regulatory flexibility, inter-agency collaboration, and strategic outcomes. Second, policy and document analysis of NRS guidelines, regulatory frameworks, project reports, and related documents.

These instruments allowed the analysis to validate stakeholder narratives against formal records and identify the consistency or gaps between regulatory design and execution. The combination ensured that findings captured both lived operational realities and structured policy narratives.

## 2.4 Data Analysis Techniques: Thematic and Comparative Mapping

This analysis conducted a textual analysis of publicly available policy documents, project reports, and related materials from the relevant sandboxes to complement the interview data. This approach shed light on the regulatory narratives, policy directions, and structural challenges that shape the sandbox ecosystem. Thematic coding of interview data surfaced recurring issues, including regulatory bottlenecks, ecosystem readiness, and socio-economic outcomes.

Comparative mapping of policy and project documents further contextualised these themes, tracing the connection between regulatory design and real-world implementation. This dual analytical approach, which combines inductive field insights with deductive alignment with research objectives, generates findings that are both practically grounded and strategically relevant for decision-makers, in line with established qualitative research practice.





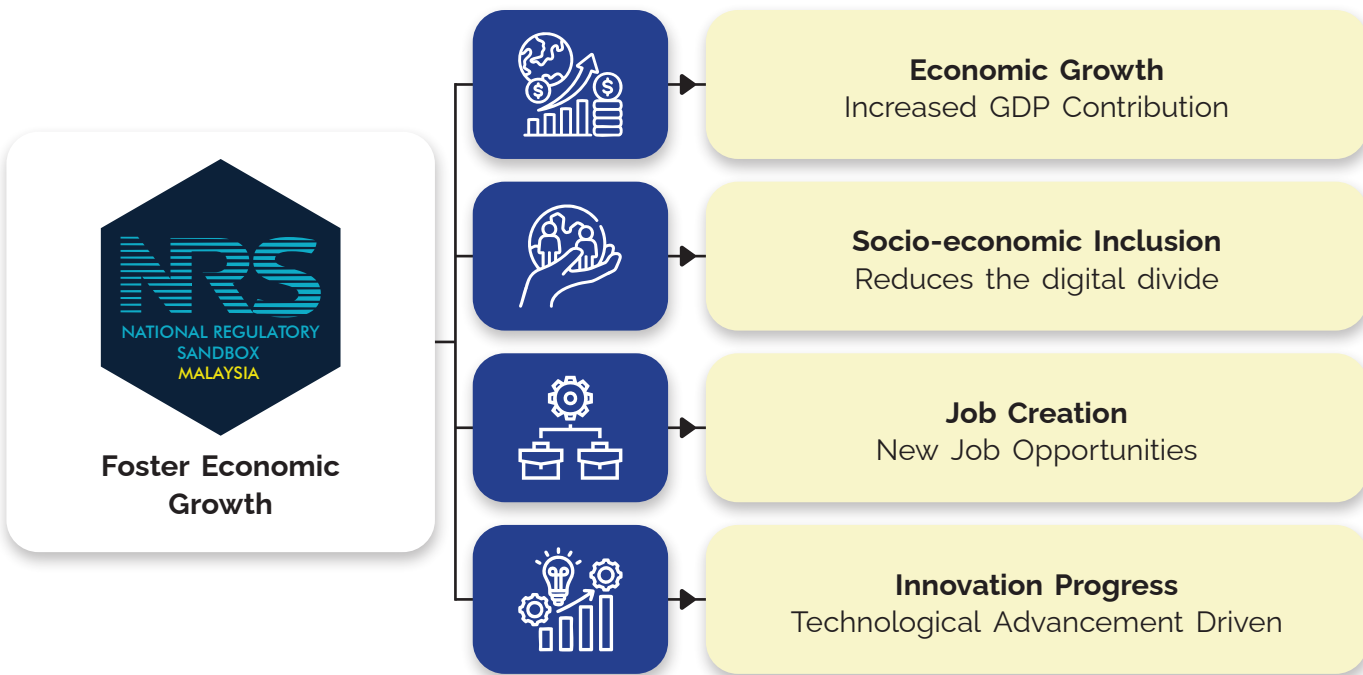
**SECTION III:  
NATIONAL LEVEL SOCIO-  
ECONOMIC IMPACT OF NATIONAL  
REGULATORY SANDBOX (NRS)**

### 3.1 Impact on Innovation Policy and Regulatory Agility



Malaysia's NRS represents a transformative approach to governance, enabling regulatory frameworks to evolve in tandem with technological advancements. That of which, the NRS creates an environment where innovators can test new products within controlled parameters, allowing regulators to gather evidence for informed policy adjustments. This approach proves particularly valuable in sectors where technological change outpaces traditional regulatory cycles, enabling Malaysia to balance innovation promotion with robust public-interest safeguards, a core objective of its national digital strategy.

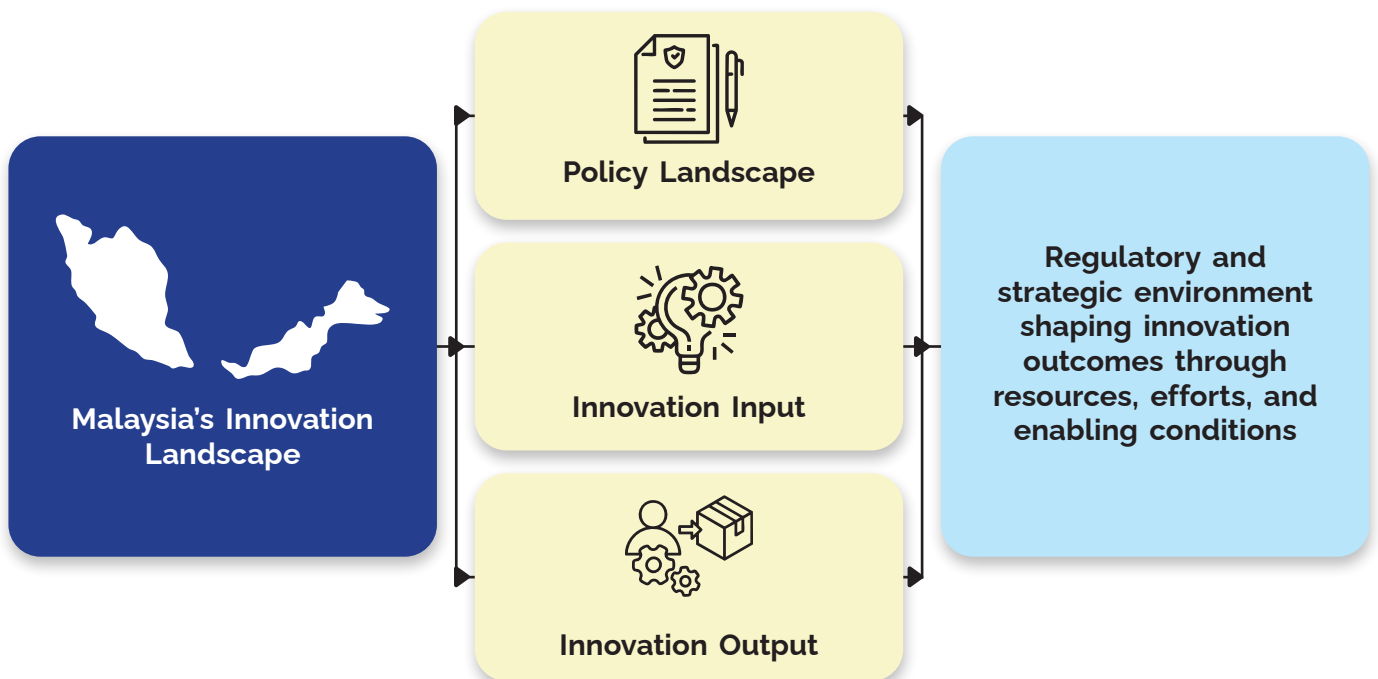
The Online Healthcare Services Regulatory Lab (OHS RegLab) exemplifies this approach by addressing the regulatory vacuum in digital health services. According to interview data, the sandbox provided a structured environment for testing e-prescription technologies that previously operated in a "legal grey area." This process enabled regulators to develop evidence-based regulations, culminating in amendments to the Poisons Act 1952 that govern digital signatures for remote prescriptions (Attorney General's Chambers, 2023). The collaborative model between innovators and regulators allowed for real-time feedback and iterative policy refinement. This approach demonstrates how regulatory sandboxes can compress the traditional policy development timeline while maintaining rigorous safety standards.



## 3.2 Industrial Transformation and Adoption of Emerging Tech

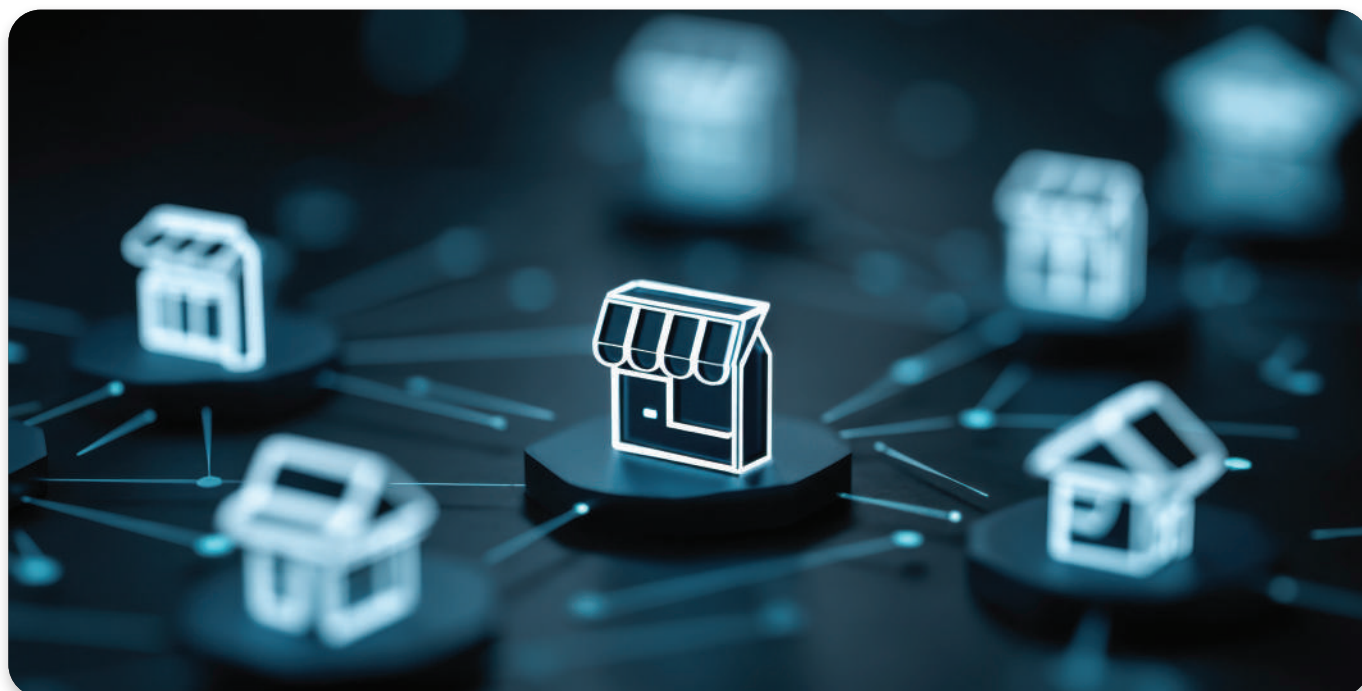


The NRS positions Malaysia to capture economic opportunities in sectors aligned with the National Fourth Industrial Revolution (4IR) Policy and the Malaysia Digital Economy Blueprint.



In the digital health sector, the Online Healthcare Services Regulatory Lab (OHS RegLab) facilitated the validation of online healthcare platforms, which the service itself recorded an approximate 200% increase in usage during the COVID-19 movement restrictions in other parts of the world.<sup>13</sup> According to a digital health provider, the sandbox provided a structured environment to test regulatory provisions under the Ministry of Health's purview, enabling co-development of operational frameworks for online consultations and e-prescriptions. Similarly, the Malaysia Autonomous Vehicle (MyAV) sandbox has established designated test routes in Cyberjaya, Putrajaya, and Iskandar Puteri, creating a foundational infrastructure for next-generation mobility systems as outlined in the National Automotive Policy 2020.

### 3.3 Inclusion of Micro, Small, and Medium-sized Enterprises (MSMEs) and Bridging the Innovation Gap



The NRS bridges innovation and regulatory gaps across industries, whether for large corporations or MSMEs, through regulatory testing environments that would otherwise be financially prohibitive. A representative from a digital health provider confirmed that the sandbox model can help validate ideas and solutions, ensuring they are safe and compliant with various laws and regulations, a feature they noted is particularly valuable for resource-constrained enterprises.

However, interview data revealed a significant challenge in transitioning from sandbox validation to commercial viability. Industry feedback suggests that the sandbox environment creates a sheltered setting that does not expose innovations to the harsh competitive pressures of the actual marketplace. This perception underscores a critical gap, highlighting the need for additional support mechanisms to bridge the “commercialisation valley of death” that many sandbox-tested innovations face<sup>14</sup>.

<sup>13</sup> Ministry of Health Malaysia. (2021). Telemedicine development and utilisation report during the COVID-19 pandemic. Putrajaya: Ministry of Health Malaysia.

<sup>14</sup> Heydoc Health. (2025, October 18). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

Participants indicated that while the sandbox effectively mitigates regulatory risk, it does not inherently resolve core commercial challenges such as market risk, achieving product-market fit, or scaling user acquisition.

**Table 2: MSME Support Mechanisms in Malaysia's Regulatory Sandboxes**

SUPPORT MECHANISM	OHS REGLAB	MYAV SANDBOX
REGULATORY GUIDANCE	Structured feedback on compliance with healthcare regulations.	Safety validation and testing protocols.
TECHNICAL INFRASTRUCTURE	Access to testing frameworks for digital health solutions.	Designated test routes and monitoring systems.
STAKEHOLDER CONNECTIONS	Facilitation of dialogue with the Ministry of Health.	Collaboration with MOT, JPJ, MARii, APAD, MIROS, KKR, and UTM.
MARKET ACCESS SUPPORT	Limited assistance with commercial transition.	Pilot testing in controlled public environments.

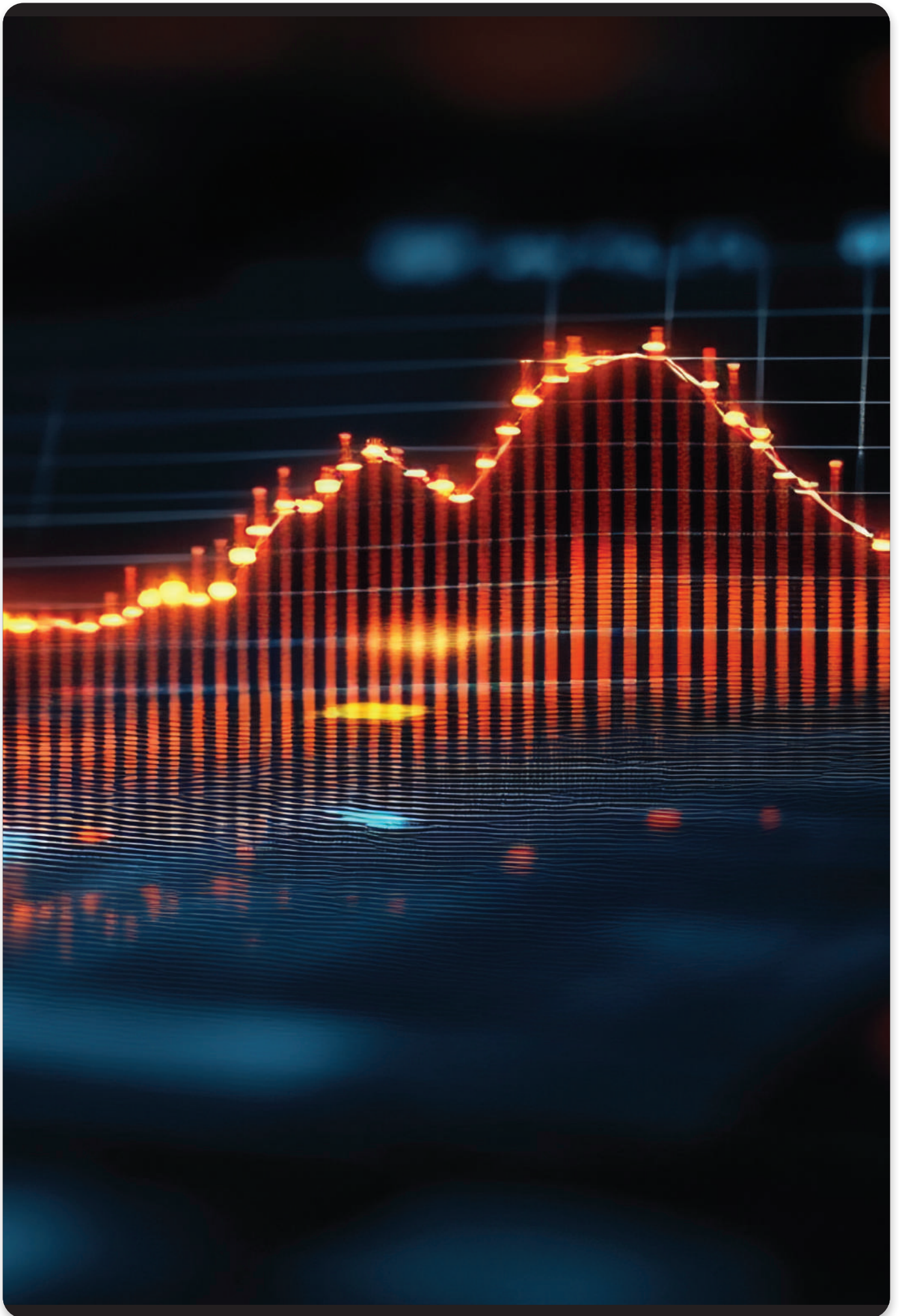
### 3.4 Institutional Readiness, Trust, and Policy Reform Trajectories

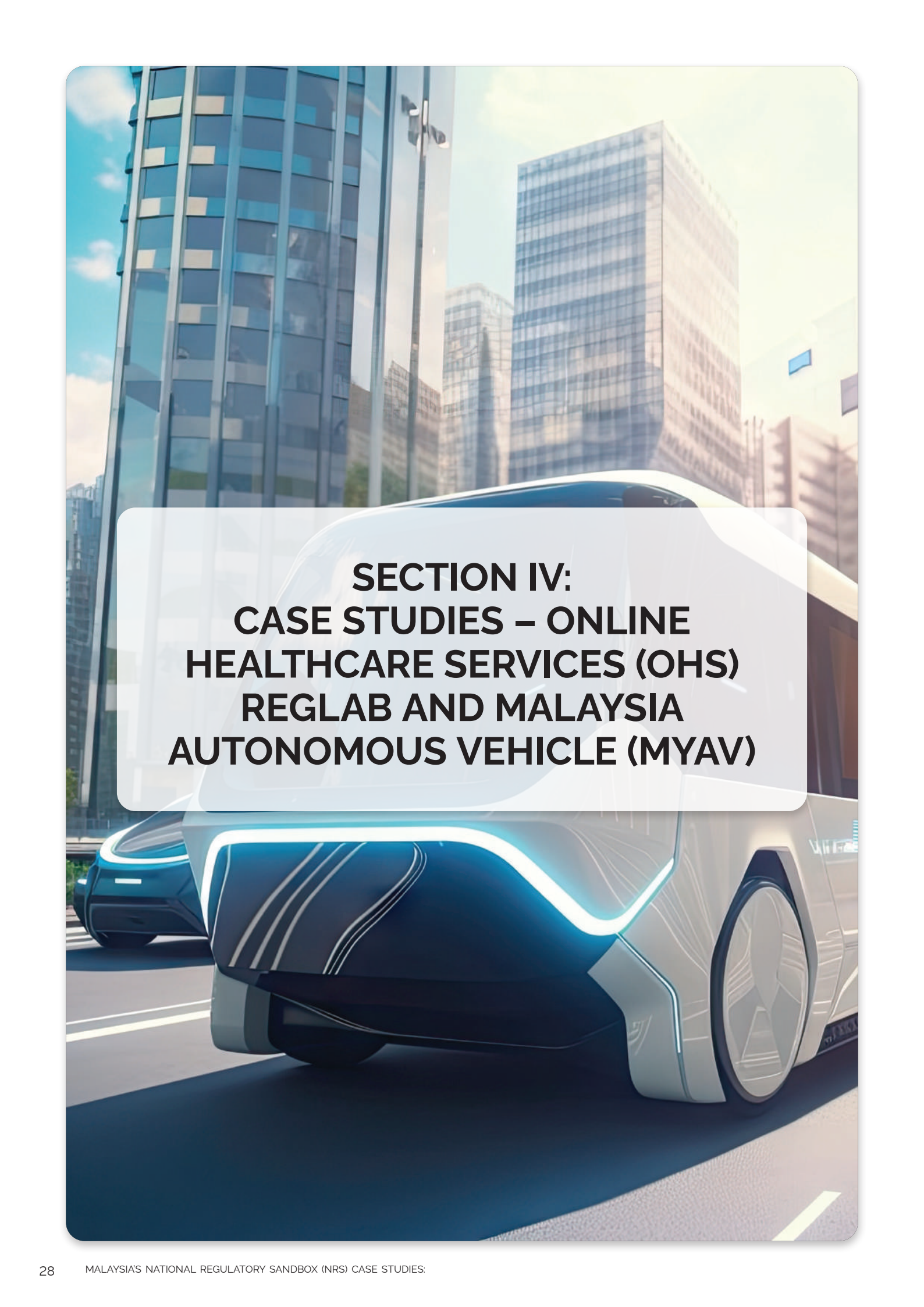
Malaysia's regulatory sandboxes are enhancing institutional capacity within its regulatory bodies by creating structured mechanisms for engagement with emerging technologies. According to a representative from the Malaysian Institute of Road Safety Research (MIROS), participation in the MyAV Evaluation Committee has enabled the organisation to develop specialised expertise in autonomous vehicle safety assessment, particularly through the application of the Malaysia Road Assessment Program (MyRAP) to evaluate proposed test routes<sup>15</sup>.

Furthermore, the sandbox approach fosters inter-agency collaboration frameworks that address complex, multi-domain regulatory challenges. However, interview data indicate that coordination difficulties persist. A digital health provider noted that while collaboration with the Ministry of Health was effective, engagement with other relevant agencies remained "a little bit fragmented," a dynamic that can delay the deployment of innovation in fast-moving sectors.

Looking forward, these sandboxes are evolving into formal policy reform pathways. The OHS RegLab is directly informing the development of the anticipated Digital Health Act, while the MyAV sandbox is contributing to the development and inclusion of autonomous vehicles in Malaysia. These legislative initiatives demonstrate how regulatory experimentation serves as an evidence-generating mechanism for systemic modernisation, a process aligned with theories of experimentalist governance.

<sup>15</sup> Ibrahim, T. I. (2025, September 19). In-depth interview with Ts. Gs. Azzuhana Roslan, Malaysian Institute of Road Safety Research (MIROS) [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).





**SECTION IV:  
CASE STUDIES – ONLINE  
HEALTHCARE SERVICES (OHS)  
REGLAB AND MALAYSIA  
AUTONOMOUS VEHICLE (MYAV)**

## 4.1 Case Studies Focus: Online Healthcare Services (OHS) RegLab and Malaysia Autonomous Vehicle (MyAV)



The Malaysian government established the OHS RegLab as a targeted response to critical regulatory shortcomings in the digital healthcare sector. This crisis-driven circumstance, marked by a dramatic surge in demand for remote care, highlighted systemic risks such as clinical misdiagnosis, unregulated pharmaceutical dispensing, and breaches of patient data privacy. The sandbox enabled the government and health innovators to co-develop evidence-based, future-ready regulatory approaches while safeguarding patient welfare. Notably, the OHS RegLab served as a multi-stakeholder platform, bringing together regulators, service providers, and policymakers to ensure digital healthcare remains accessible, accountable, and secure<sup>16</sup>.

Running in parallel, the Malaysia Autonomous Vehicle (MyAV) Sandbox represents Malaysia's strategic leap into next-generation mobility, aligned with the National Automotive Policy 2020 (NAP, 2020), which promotes Next-Generation Vehicles (NxGV) and Mobility-as-a-Service (MaaS). It provides a structured environment for the phased testing of autonomous vehicles (AVs) on public roads, supported by a network of designated test routes across key urban and suburban areas.

This initiative promotes intricate inter-agency coordination among enforcement authorities, technology developers, and municipal councils to ensure the safe and responsible deployment of AV technologies. The "Guideline for Public Road Trials of Autonomous Vehicles" provides the national regulatory framework for these tests, contributing directly to road safety, policy readiness, and public confidence<sup>18</sup>.

Collectively, these case studies demonstrate how the NRS functions as a national mechanism for regulatory experimentation, facilitating the real-world testing of emerging technologies while maintaining robust public safeguards. The OHS RegLab and MyAV are not merely technical pilot projects; they are initial regulation blueprints that set out in redefining sectoral governance and contribute to the maturation of Malaysia's digital and innovation ecosystems.

By addressing regulatory gaps through adaptive and cross-sectoral collaboration, the NRS accelerates policy development cycles, enhances public trust, and increases investor confidence. These outcomes are essential in positioning Malaysia as a regional leader in the innovation economy.

<sup>16</sup> Ministry of Health Malaysia & Futurise Sdn Bhd. (2022, February 23). Press release: Ministry of Health and Futurise announce major milestone with the launch of Online Health Service Regulatory Lab (OHS RegLab).

<sup>17</sup> Malaysian Investment Development Authority. (2021, March). Malaysia is steering towards autonomous vehicle technology.

<sup>18</sup> Tan, C. S., Lokman, S., Rao, Y., Kok, S. H., & Long, C. M. (2021). Public and private sectors collective response to combat COVID 19 in Malaysia. *Journal of Pharmaceutical Policy and Practice*, 14, Article 40.

## 4.2 Case Study 1: Online Healthcare Services (OHS) RegLab



### Data Governance and Privacy

The sandbox established robust frameworks for data confidentiality, accountability, and traceability in online health services. This initiative became critical as the rapid digitisation of health services significantly heightened the risks of data breaches and unauthorized access (Personal Data Protection Act 2010). The resulting guidelines mandated explicit patient consent for recording consultations and required service providers to implement robust privacy policies for managing Electronic Medical Records (EMRs).

### Guidelines and Practice Frameworks

The OHS RegLab initiative addressed the legal vacuum surrounding telemedicine by developing interim guidelines while the Ministry of Health prepares a more comprehensive Digital Health Act (MOH, 2023). A significant challenge was integrating private healthcare providers, who operate on a different financial and operational model than the public system, into a cohesive national framework for digital health delivery<sup>19</sup>. These interim guidelines clearly defined the scope of online healthcare practice and established critical standards for e-prescriptions to prevent misuse and abuse.

### Public Trust and Safety Mechanisms

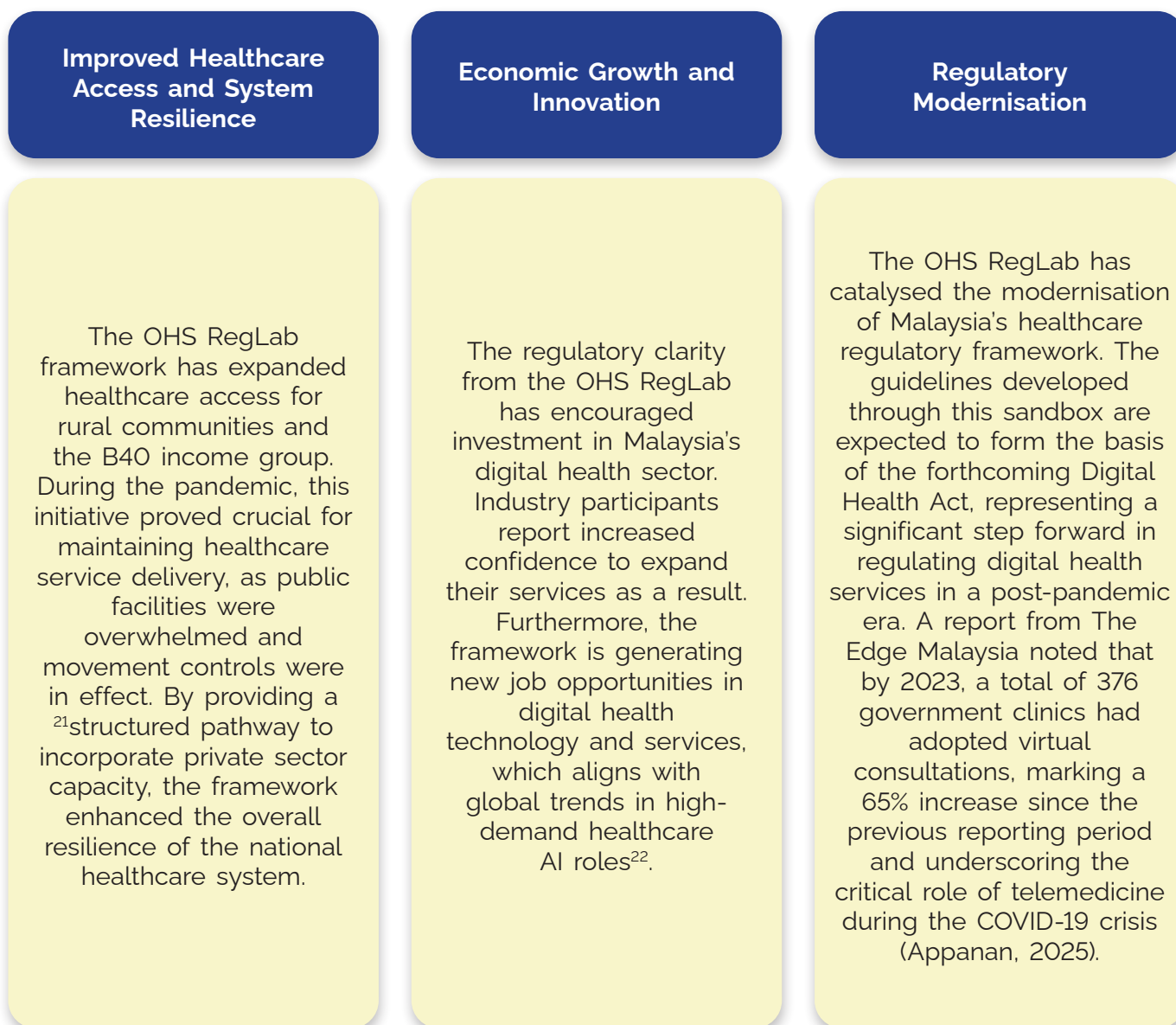
The OHS RegLab implemented robust transparency and safety protocols for the industry players that voluntarily participate this initiative to build public confidence in digital health services. These measures ensured accountability and protected patient welfare throughout the service delivery cycle<sup>20</sup>.

<sup>19</sup> Malaysian Medical Council. (2024). Guideline on Telemedicine.

<sup>20</sup> Futurise Sdn. Bhd. (2022, February 23). Press release: Launch of Online Healthcare Services Regulatory Lab (OHS RegLab) for Malaysian healthcare industry.

## 4.2.1 The OHS RegLab Socio-Economic Impact and Outcomes

The OHS RegLab has generated significant socio-economic benefits since its implementation:



## 4.3 The Online Healthcare Services Regulatory Lab (OHS RegLab) Implementation Context

The OHS RegLab initiative emerged in response to persistent regulatory ambiguities within Malaysia's digital healthcare ecosystem, which had raised critical concerns over unlicensed consultations, clinical misdiagnosis, excessive or inappropriate prescribing, and the potential misuse of online platforms to access controlled substances.

The rapid escalation of remote healthcare usage during national movement restrictions underscored the urgency of establishing a structured governance model, positioning the OHS RegLab as a proactive instrument for regulatory learning and evidence-based policymaking<sup>23</sup>.

21 Tan, C. S., Lokman, S., Rao, Y., Kok, S. H., & Long, C. M. (2021). Public and private sectors collective response to combat COVID 19 in Malaysia. *Journal of Pharmaceutical Policy and Practice*, 14, Article 40.

22 Adepu, H. (2025, September 16). 5 most promising AI jobs in healthcare industry in 2025. *Analytics Insight*.

23 Ministry of Health Malaysia. (2021). *Telemedicine development and utilisation report during the COVID-19 pandemic*. Putrajaya: Ministry of Health Malaysia.

The OHS RegLab deployed a controlled trial model in which selected providers delivered services online under rigorous monitoring; the implementation strategy emphasised collaborative feedback among the Ministry of Health Malaysia, Futurise and industry stakeholders, focusing squarely on safety, service quality, data confidentiality, and clinical accountability. As a transitional mechanism, the sandbox directly informed the development of broader digital health legislation that policymakers plan to finalise in line with the Malaysia Digital Economy Blueprint (MyDIGITAL)<sup>24</sup>.

## Implementing OHS RegLab for Digital Healthcare



## 4.4 Key Regulatory Issues: Data Governance, Public Trust

### 4.4.1 Data Governance

The OHS RegLab established pioneering frameworks for data governance in digital health services, emphasising principles of concealment. Interview data confirms that the sandbox guidelines addressed critical concerns regarding patient data storage, access authority, and the legal status of consultation recordings.

One digital health provider noted that their platform implemented robust data protection measures from inception, benchmarking against international standards from Singapore and India to ensure comprehensive privacy safeguards.<sup>25</sup>The governance Electronic Medical Records (EMRs), methodologies will inform the broader “One Person, One Record” initiative under the Ministry of Health’s digital transformation agenda, thereby laying the foundation for Malaysia’s evolving digital health infrastructure.

<sup>24</sup> Ministry of Economy Malaysia. (2021). Malaysia Digital Economy Blueprint (MyDIGITAL). Prime Minister’s Department.

<sup>25</sup> Heydoc Health. (2025, October 18). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

## 4.4.2 OHS Regulatory Framework

The OHS RegLab addressed significant regulatory gaps in Malaysia's healthcare framework. Existing legislation, such as the Medical Act 1971, primarily outlined conventional practices in registered premises without adequately addressing digital healthcare delivery models. According to a digital health provider, the sandbox provided essential "regulatory certainty" during a period of legal ambiguity, enabling the testing of services that had previously operated in a "self-regulated" environment (DOC2US Interview, 2025).

A pivotal achievement of the sandbox initiative was the successful validation of electronic-prescription technologies employing digital signatures in full compliance with the Digital Signature Act 1997, following an extended period of iterative, collaborative dialogue between innovators and regulators to directly address authentication and traceability challenges in remote prescribing<sup>26</sup>. Subsequently, successful piloting in the sandbox environment contributed to concrete legislative reform under the Poisons (Amendment) Act 2022, which amends the Poisons Act 1952 to provide formal legal recognition of digitally signed prescriptions. One industry provider has estimated that the process from the initial implementation of electronic prescribing in the sandbox through to legislative change took approximately four to five years to complete<sup>27</sup>.

## 4.4.3 Public Trust in Digital Health Adoption

The sandbox implementation revealed specific trust-related concerns, including liability allocation for AI-generated medical advice, technology failures during consultations, preventing e-prescription abuse, identity verification for both patients and practitioners, and the legal recognition of digital medical certificates. These issues underscore the need for comprehensive regulatory frameworks that address both technical safety and public perception, thereby facilitating the broader adoption of digital health services.

## 4.4.4 Qualitative Results: Productivity, User Access, Cost-efficiency

Participation in the OHS RegLab yielded significant qualitative benefits for digital health providers, particularly in streamlining operational workflows and enhancing service delivery mechanisms. According to interview data, the sandbox enabled the refinement of fully digital, end-to-end e-prescription systems that significantly reduced the time between patient consultation and medication fulfilment. This digital streamlining enhanced clinician productivity by minimising administrative tasks and reducing operational costs associated with manual prescription handling. In terms of user access, the sandbox played a pivotal role in legitimising service models that address healthcare inequities.

One provider noted that the regulatory clarity provided by the OHS RegLab was fundamental in developing services that could reliably reach rural populations and low-income groups. By creating a framework for safe and accountable teleconsultations, the sandbox enabled innovators to build services with explicit socio-economic objectives, including expanding access for underserved communities. The iterative development process within the sandbox enabled providers to proactively embed robust safety and compliance measures into their technology architecture. A digital health provider noted that engaging with regulators early, while initially time-consuming, prevented costly pivots and potential legal challenges post-launch. This "right-first-time" approach represents significant long-term cost savings and enhances the sustainability of digital health innovations.

<sup>26</sup> Ministry of Health Malaysia. (2022). Poisons (Amendment) Act 2022 [Act A1666]. Laws of Malaysia. Percetakan Nasional Malaysia Berhad.

<sup>27</sup> CodeBlue. (2022, March 15). Revise the Flawed Poisons Act (Amendment) Bill 2022.

## 4.5 Developer Perspectives: Flexibility, Legitimacy, Risk Navigation



Digital health providers reported that the OHS RegLab provided a crucial “safe space” that balanced necessary regulatory oversight with the flexibility required for innovation. A provider reported that their primary motivation for participating in the sandbox derived from the regulatory ambiguity surrounding digital health, noting that the sandbox provided a structured environment to operate and innovate without immediate fear of penalisation for unintended regulatory breaches. This flexibility fostered a collaborative rather than adversarial relationship with regulators.

The sandbox’s role in conferring regulatory legitimacy emerged as a significant theme in developer perspectives. For digital health platforms, trust is described as “the most critical currency,” particularly in a virtual environment where traditional physical cues of healthcare credibility are absent. While the direct impact of ‘sandbox-tested’ status on patient acquisition was not quantified, the process provided an invaluable seal of approval, signalling to patients, healthcare professionals, and investors that the platform had undergone rigorous scrutiny.

Regarding risk navigation, developers highlighted the sandbox’s value in identifying and mitigating regulatory challenges early in the development process. One provider illustrated this with the multi-year journey to legitimise e-prescriptions, where sandbox facilitation enabled the transition from simple electronic signatures to more secure, legally recognised digital signatures. This proactive risk navigation prevented potentially business-crippling compliance issues after full market launch.

## 4.6 Stakeholder Collaboration and Learning



The OHS RegLab functioned as a dynamic platform for multi-stakeholder collaboration, with Futurise acting as a critical “catalyst and facilitator” between innovators and regulators. A digital healthcare provider described the relationship as “synergistic,” breaking down conventional adversarial dynamics between innovators and regulatory bodies. This cooperative model transformed the regulatory process from a gatekeeping exercise into a partnership aimed at solving real-world healthcare delivery problems.

A key learning from this collaboration was the demonstrable value of radical transparency between stakeholders. By openly sharing workows, technologies, and safety protocols, digital health providers-built trust with regulators, enabling a shift from purely enforcement-based approaches to guidance and co-development.

The successful amendment of the Poisons Act 1952, based on evidence generated from over three million transactions on a digital health platform, demonstrates how sandboxes can serve as evidence-generating mechanisms for long-term policy reform. However, developers identified room for improvement in multi-agency coordination beyond the Ministry of Health. One provider noted that engagement with other relevant bodies could be “a little bit fragmented,” potentially causing delays that impact innovation in fast-moving technological sectors. This highlights the need for more synchronised, “whole-of-government” engagement within sandbox processes to streamline the path from innovation to market<sup>28</sup>.

<sup>28</sup> Heydoc Health. (2025, October 18). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

## 4.7 Socio-Economic Implications: Public Trust, Job Creation, and Inclusivity



### 4.7.1 Public Confidence in Digital Health Safety

The OHS RegLab highlighted the critical importance of public trust in digital health adoption, with one provider noting that “everything in healthcare is about trust.” This challenge is particularly acute in online environments where patients cannot physically interact with healthcare professionals. The sandbox addressed these concerns through rigorous safety validation and compliance frameworks, laying the foundation for building public confidence in digital health services.

### 4.7.2 Job Creation and Industrial Development

While direct job creation from OHS RegLab participation was limited according to interview data, the sandbox has contributed to the development of a broader digital health ecosystem that creates demand for specialised roles in health technology, data science, AI development, and digital compliance. One provider noted that they did not hire specifically as a result of RegLab participation, suggesting that employment impacts may be more evident at the ecosystem level rather than within individual participant organisations.

### 4.7.3 Mobility and Social Inclusion

The OHS RegLab demonstrated significant accessibility for underserved and marginalised groups, by validating telemedicine models that overcome geographical barriers, the sandbox has supported innovations that address healthcare disparities. However, a digital health provider noted that, despite these advancements, adoption rates remain around 10% in specific segments, indicating persistent challenges in achieving widespread inclusion.

### 4.7.4 Comparative Positioning in ASEAN and Beyond

Malaysia's approach to digital health regulation through the OHS RegLab positions the country as a regional leader in balancing innovation facilitation with appropriate safeguards. The sandbox model has enabled Malaysia to develop regulatory frameworks informed by international best practices, while addressing local contextual factors, creating a potential reference point for other ASEAN countries as they develop their own digital health regulations.

## 4.8 Summary of Key Insights and Foresight



The OHS RegLab case study yields several key insights for innovation policy. First, the sandbox model effectively transforms regulatory uncertainty into structured innovation pathways, providing developers with the necessary flexibility while maintaining public safety safeguards. Second, trust and transparency among stakeholders are critical success factors that require openness from both innovators and regulators. Third, the sandbox effectively addresses regulatory risk but does not inherently solve commercial viability challenges, highlighting a need for additional support mechanisms.

Looking forward, digital health providers recommend more proactive regulatory review processes that regularly assess and update frameworks to keep pace with technological changes. Additionally, the transition from sandbox validation to market success requires more robust support mechanisms to bridge the “commercialisation valley of death.” As one provider noted using a metaphor, the sandbox must not only “groom the baby turtles” but also ensure they can survive when released into the “cruel open sea” of commercial markets<sup>29</sup>.

<sup>29</sup> Heydoc Health. (2025, October 18). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

## 4.9 Case Study 2: MALAYSIA AUTONOMOUS VEHICLE (MYAV)



The Malaysia Autonomous Vehicle (MyAV) initiative, introduced in 2019, represents a national effort to position Malaysia as a regional frontrunner in autonomous vehicle development. Aligned with the National Automotive Policy 2020 (NAP, 2020), the initiative classifies Next-Generation Vehicles (NxGVs) as those equipped with at least Level 3 automation (conditional automation). Operated with Futurise acting as the secretariat and supported by key agencies, including the Ministry of Transport Malaysia (“MOT”), Road Transport Department Malaysia (“JPJ”), Malaysia Automotive Robotics and IoT Institute (“MARII”), Agensi Pengangkutan Awam Darat (“APAD”), Malaysian Institute of Road Safety Research (“MIROS”), Kementerian Kerja Raya (“KKR”), and Universiti Teknologi Malaysia (“UTM”), the sandbox provides a coordinated, multi-agency platform to tackle the regulatory complexities associated with testing and deploying autonomous vehicles. The infrastructure provides a comprehensive testing ecosystem that simulates real-world conditions while maintaining safety controls. The MyAV sandbox has established a network of test routes in strategic locations.

LOCATION	CHARACTERISTICS & PURPOSE
CYBERJAYA	The first public road-testing route (7 km) features urban environments with dynamic traffic <sup>2-9</sup> .
MRANTI PARK	A controlled area for Internet-Of-Things related testbed.
BRT SUNWAY	Public transport corridors for integration testing on closed-circuit regulatory testbed with existing transit systems.
PUTRAJAYA	A regulatory testbed with designated routes specific for people moving in Putrajaya.
ISKANDAR PUTERI	A regulatory testbed in Johor for interconnectivity transport hub.

## 4.9.1 The MyAV Regulatory Framework and Safety Protocols

The MyAV initiative operates within a sophisticated regulatory framework, notably the Guideline for Public Road Trials of Autonomous Vehicles<sup>30</sup> (Version 4, updated February 23, 2022).<sup>31</sup>This guideline is crucial for addressing the unique challenges of the Malaysian environment, including variable weather conditions, complex traffic patterns, and road-signage issues, such as graffiti or unclear markings that can compromise the accuracy of sensors in autonomous vehicles<sup>32</sup>. Key components include:

### Technical Requirements

The Applicant must ensure that the vehicles to be installed with AV technologies (component and system) have a valid motor vehicle registration with JPJ. The safety officer must hold a valid Malaysian competent driving licence in the relevant class when driving the vehicle. The usage of the vehicle on the road must adhere to all road traffic rules and regulations under the Road Transport Act.

In addition, the trialling vehicles must be equipped with the following:

1. A fallback mechanism.
2. A warning system that must be able to immediately and effectively alert and warn the Safety Officer of any system failure or error during the trial so that necessary safety actions can immediately be taken.
3. A suitable fire suppression system for road vehicle application.
4. An emergency stop (E-stop) switch, as a safety mechanism used to mechanically switch off all systems in an emergency, when the AV cannot be shut down in the normal manner.

### Safety Management

The guidelines mandate that Safety Officers monitor operations in real-time and retain manual override capabilities. Furthermore, testing organisations assume strict liability for all accidents, system failures, and infrastructure damage, as outlined in national transport legislation (Road Transport Act 1987 [Act 333]).

### Phased Testing Approach

Focuses on controlled testing to validate safety, technical specs, and performance in real-road conditions on Route A (Pre-Trial Phase) and Builds on Route A with expanded operations, including diverse road infrastructures (e.g., signs, potholes, construction) in Route B.

30 Futurise Sdn. Bhd. (n.d.). Regulatory Experiment – MyAV.

31 Ministry of Transport Malaysia & Futurise Sdn. Bhd. (2022, February 23). Guideline for Public Road Trials of Autonomous Vehicles (Version 4).

32 Abas, M. A., et al. (2022). Synthesis of Autonomous Vehicle Guideline for Public Road Testing in Malaysia. *Sustainability*, 14(3), 1456.

33 Karakaya, B., & Bengler, K. (2023). Minimal Risk Maneuvers of Automated Vehicles: Effects of a contact analog head up display supporting driver decisions and actions in transition phases. *Safety*, 9(1), 7.

34 SGS. (n.d.). ISO/SAE 21434 certification – Road vehicles cybersecurity engineering.

35 Utimaco. (2021, February 4). ISO/SAE 21434 Explained with Automotive Compliance Tips.

## 4.9.2 The MyAV Economic Impact and Industry Development

The MyAV sandbox has generated significant economic benefits and positioned Malaysia for future mobility leadership:

### Investment Attraction and Industry Development

The autonomous vehicle ecosystem is projected to grow substantially, driven by government policy support and increased investment<sup>36</sup>. The MyAV sandbox stimulates this growth by fostering supporting industries in sensor manufacturing, data analytics, and cybersecurity. <sup>37</sup>Furthermore, the initiative prompts local companies to develop specialised capabilities in AV testing and validation services<sup>38</sup>.

### Talent Development and Job Creation

MyAV is designed to foster industry talent and drive job creation in high-skilled domains. This focus is crucial for building a local talent pool that meets the global demand for roles such as robotics engineers and AI specialists, directly preparing the workforce for the international autonomous vehicle market.

## 4.10 The Malaysia Autonomous Vehicle (MyAV) Readiness

Futurise and the Ministry of Transport (MOT) collaborated to establish MyAV under the strategic guidance of the National Transport Policy 2019-2030 and the National Automotive Policy (NAP) 2020. These policies recognise the potential of autonomous vehicles to reduce road accidents caused by human error by up to 90% (MIROS, 2022) while transforming the national transportation ecosystem toward Connected Mobility.

According to a MIROS representative, the Malaysia Road Assessment Program (MyRAP) evaluates all proposed test routes and permits trials only on roads rated three stars or above. This careful infrastructure planning positions Malaysia as an ASEAN leader in providing regulatory certainty for autonomous vehicle integration, supported by cross-agency collaboration at federal, state, and local authority levels.

## 4.11 The Malaysia Autonomous Vehicle (MyAV) Readiness

The MyAV sandbox operates through a phased testing approach that progresses from controlled environments to public road trials. Phase A requires at least 6 months of testing in limited-traffic environments to validate basic safety cases. Upon approval by the Evaluation Committee, Phase B permits operations on public roads with daily commuters.

<sup>36</sup> Frost & Sullivan. (2020, March 27). Increasing acceptance of autonomous vehicles uncovers multi billion dollar opportunities in mobility services. PR Newswire.

<sup>37</sup> Ministry of Transport Malaysia. (2023, June 1). Autonomous vehicles guideline, Version 6.0.

<sup>38</sup> Malaysian Investment Development Authority (MIDA). (n.d.). Malaysia steering towards autonomous vehicle technology.

Passenger service tests may only commence after the successful completion of Phase B and must be accompanied by comprehensive Safety Management Plans that detail emergency protocols and fallback mechanisms.

According to a MIROS representative, current autonomous vehicle trials in Malaysia face several operational limitations (MIROS interview, 2025). Technological and infrastructure constraints prohibit testing during heavy rain or at night. Furthermore, a speed geofencing mandate limits all test vehicles to 50 kilometres per hour, reflecting a cautious safety management approach during this early deployment stage<sup>39</sup>.

Malaysia's legal framework for autonomous vehicle (AV) testing adopts an indemnification-based liability model as outlined in the Guideline for Public Road Trials of Autonomous Vehicles Version 6.0 (17 December 2024).

Under this framework, trial organisations bear full responsibility for any accidents, injuries, system failures, or damage arising from their AV trials. The guideline mandates that testing entities must obtain adequate liability insurance covering potential harm to vehicles, road users, pedestrians, public infrastructure, and third-party property before conducting any trials. Government agencies, including the Ministry of Transport (MOT), APAD, JPJ, Futurise, MIROS, MARii, and local authorities, are expressly exempt from liability. Trial organisations are required to indemnify and hold them harmless from all related claims, losses, or damages. <sup>40</sup>This approach effectively places the operational and financial risks of AV testing on private applicants while ensuring public safety and regulatory accountability.

## 4.12 International Benchmarking and National Strategy

Malaysia's autonomous vehicle strategy adopts a 'global' approach, integrating global standards with local requirements. The National Automotive Policy 2020 defines Next Generation Vehicles (NxGV) as Energy-Efficient Vehicles with a minimum Level 3 Vehicle Automation, aligned with SAE J3016 Levels of Driving Automation, while incorporating specific requirements for tropical climates, such as sensor performance in monsoon rain.

Malaysia is actively participating in international standard-setting mechanisms for road and vehicle safety. It engages with the United Nations Economic Commission for Europe's World Forum for Harmonisation of Vehicle Regulations (WP.29) through its role as a national body, contributing research, data, and regional coordination<sup>41</sup>.

At the same time, Malaysia is working to adopt global best practices in mobility and vehicle regulation by participating in readiness assessments and indices for example, autonomous vehicle readiness frameworks. These international engagements enable Malaysia not only to implement global best practices domestically but also to help shape regional harmonised standards.

<sup>39</sup> Malaysian Institute of Road Safety Research. (2025, September 19). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

<sup>40</sup> Ministry of Transport Malaysia. (2024). Guideline for Public Road Trials of Autonomous Vehicles (Version 6.0). Putrajaya: Ministry of Transport Malaysia.

<sup>41</sup> Malaysian Institute of Road Safety Research. (2025, September 19). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

A key component of this regional standard-setting effort is the creation of an ASEAN coordination mechanism for example, via the ASEAN Standard Coordination Fund, under the country's automotive development agenda<sup>42</sup>.

In line with this, Malaysia's automotive strategy, as outlined in the national policy framework such as the National Automotive Policy 2020 and the New Industrial Master Plan 2030, emphasises regional cooperation, regulatory alignment, and industrial advancement.

## 4.13 Qualitative Results: Talent Demands, Safety Innovation, Tech Readiness

The MyAV initiative highlights a growing demand for highly skilled professionals who can manage autonomous-human handover processes and troubleshoot in unpredictable Malaysian driving contexts. According to a MIROS representative, current safety driver training may lack standardisation, suggesting a potential gap in human capital development for Level 3 automation and beyond. In terms of safety innovation, the MyAV sandbox is working towards geofencing and speed restrictions as primary risk mitigation strategies. The Malaysia Road Assessment Program (MyRAP) serves as a key safety validation tool, with routes requiring a minimum three-star rating before autonomous vehicle testing is permitted.

This approach ensures that testing occurs in environments with documented safety performance, though a MIROS representative noted limitations in data sharing that hinder comprehensive safety analysis.

Regarding technology readiness, Malaysia's autonomous vehicle trials remain restricted to daytime, non-rainy conditions, reflecting current infrastructural and technological limitations in handling mixed traffic, high pedestrian density, and the challenges of tropical weather. A MIROS representative indicated that expanding testing to more challenging conditions will require both technological improvements and infrastructure enhancements, particularly in the quality of road signage and marking.

## 4.14 Developer Perspectives: Institutional Coordination and Policy Gaps

Stakeholder coordination within the MyAV sandbox highlights both the strengths and challenges of multi-agency collaboration. A MIROS representative noted that effective collaboration between MOT, JPJ, MIROS, Futurise, JKR, and local councils has enabled the successful implementation of MyAV pilots in Cyberjaya and other controlled testbeds. Specific successes include collective risk mitigation for pedestrians and cyclists in Cyberjaya through MIROS-led safety assessments and multi-agency dialogue.

However, policy gaps and data-sharing bottlenecks remain significant hurdles. A MIROS representative highlighted that, despite serving on the evaluation committee, the organisation has limited access to raw autonomous vehicle trial data, hindering real-time, evidence-based policymaking. Data restrictions between agencies, which create obstacles in developing a Malaysian Autonomous Vehicle Risk Model (MyAV-RM).

<sup>42</sup> Malaysian Institute of Road Safety Research (MIROS), "Penubuhan Garis Panduan Pelaksanaan UNECE WP.29", MIROS, "MCP 02/2012".

Another institutional barrier is Malaysia's fragmented road authority hierarchy, comprising city councils, JKR, and highway authorities, which complicates the uniform enforcement of autonomous vehicle policies.

These governance silos delay scaling efforts beyond limited pilot areas, raising concerns about how MyAV can transition smoothly from Proof of Concept to nationwide deployment<sup>43</sup>.

## **4.15 Socio-Economic Implications: Public Trust, Job Creation, and Inclusivity**

### **4.15.1 Public Trust and Safety Perception**

A MIROS representative consistently highlighted public trust as the key barrier to widespread autonomous vehicle adoption, with safety validation serving as a prerequisite for public legitimacy. The representative noted that international surveys show approximately 67% of respondents in Southeast Asia remain concerned about autonomous vehicle safety, compared to 47% in the UK and 38% in Singapore. Malaysia's cautious phased deployment mirrors strategies in other markets, where initial testing occurs in highly controlled zones to build public confidence through demonstrated safety performance.

### **4.15.2 Job Creation and Industrial Development**

The MyAV initiative holds significant potential to stimulate new industry clusters centered on AI, the Internet of Vehicles (IoV), telematics, and smart infrastructure. Near-term job creation is concentrating on roles for safety drivers, engineers, and regulatory specialists. As trials mature, the initiative could catalyze downstream industries such as smart road infrastructure, autonomous vehicle cybersecurity, and data analytics.<sup>44</sup> As a MIROS representative noted, this development aligns with Malaysia's strategic transition from assembly-based automotive manufacturing to knowledge intensive mobility services, which could enhance the country's competitive standing in ASEAN. The representative pointed to international models, referencing a UK report that projects autonomous vehicle deployment could create 38,000 new jobs there by 2035 (Centre for Connected and Autonomous Vehicles). This suggests a similar scale of opportunity for Malaysia, contingent on robust policy support and targeted industry development.

### **4.15.3 Mobility and Social Inclusion**

The MyAV framework offers potential long-term social benefits, particularly for elderly and differently-abled populations, by reducing dependence on human drivers and enhancing last-mile connectivity. This aligns with global benchmarks that promote autonomous vehicles as enablers of "mobility as a service" (MaaS) for vulnerable demographics. However, a MIROS representative noted significant inclusivity challenges in rural Malaysia, where road conditions and digital readiness create structural inequalities in the potential benefits of autonomous vehicles. Unlike urban Cyberjaya, where infrastructure and connectivity enable controlled autonomous vehicle trials, rural areas may remain underserved without parallel infrastructure investments, potentially concentrating the socio-economic advantages of autonomous vehicles in high-income urban zones.

43 Malaysian Institute of Road Safety Research. (2025, September 19). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

44 Malaysian Institute of Road Safety Research. (2025, September 19). In-depth interview [Unpublished raw data]. (Research: Empowering future innovation: Socio-economic impact of the National Regulatory Sandbox (NRS) in Malaysia – A case study of OHS RegLab and MyAV).

## 4.15.4 Comparative Positioning in ASEAN and Beyond

Regionally, Malaysia faces a competitive landscape in autonomous vehicle development. Singapore has advanced through contract awards for deployment of Level 4 autonomous electric buses on public roads. (source: Land Transport Authority of Singapore). Concurrently, Indonesia is experimenting with autonomous vehicle-linked innovative city projects as part of its new capital, Nusantara (Nusantara Capital City Authority). A representative from the Malaysian Institute of Road Safety Research (MIROS) characterised Malaysia's strategy as that of a "fast follower," emphasising that the nation differentiates itself through a stronger focus on safety governance. This approach has the potential to create a more sustainable foundation for long-term AV integration (MIROS interview, 2025).

45 Frost & Sullivan. (2020). Increasing Acceptance of Autonomous Vehicles Uncovers Multi-Billion-Dollar Opportunities in Mobility Services.

46 Frost & Sullivan. (n.d.). Autonomous Driving Programme Overview.

47 ASEAN Secretariat. (2024). ASEAN Autonomous Vehicle Landscape Report.

## 4.16 Summary of Key Insights and Foresight



The MyAV case study reveals Malaysia's cautious yet progressive approach to autonomous vehicle integration, with safety and infrastructure readiness serving as central pillars. Qualitative insights from MIROS highlight several key areas for attention as the initiative evolves:

1

Talent and human factors require focused development, particularly regarding safety driver training and Level 3 automation readiness.

2

Safety innovation through geofencing, speed restrictions, and staged validation provides necessary safeguards, but must evolve to support expanded testing environments.

3

Policy and governance gaps in data sharing, road authority coordination, and regulatory fragmentation must be addressed to enable scaling beyond pilot phases.

Looking forward, the success of MyAV will depend on closing these policy gaps, strengthening inter-agency collaboration, and fostering public confidence. The sandbox's ultimate impact lies in its ability to balance safety with innovation, ensuring Malaysia becomes not only autonomous vehicle-ready but also autonomous vehicle-inclusive in its socio-economic transformation.

An aerial, high-angle photograph of a city skyline, likely Kuala Lumpur, Malaysia. The image is heavily filtered with a warm, golden-brown color and a soft, hazy atmosphere. The Petronas Twin Towers are the most prominent feature, centered in the upper half of the frame. Other skyscrapers and buildings are visible in the foreground and background, creating a dense urban landscape. The overall mood is serene and futuristic.

## **SECTION V: CONCLUSION AND STRATEGIC WAY FORWARD**

## 5.1 Summary of Findings



This research evaluated the socio-economic impact of Malaysia's NRS through case studies of the Online Healthcare Services Regulatory Lab (OHS RegLab) and the My Autonomous Vehicle (MyAV) sandbox. The findings substantiate that the NRS functions as a strategic policy innovation instrument, effectively establishing a controlled and adaptive environment that mitigates technological and regulatory uncertainties while generating empirical evidence to inform progressive regulatory reforms.<sup>48</sup> Both case studies demonstrate the model's capacity to foster public-private collaboration and proactively address regulatory gaps in frontier sectors.

The analysis further identifies tangible socio-economic benefits, including expanded healthcare access in rural areas, the creation of high-skilled technology jobs, and increased foreign direct investment in the digital economy.

However, the research also reveals significant systemic challenges that constrain the NRS's full potential. Systemic challenges persist within Malaysia's innovation governance landscape, notably the fragmentation across key ministerial jurisdictions, the enduring regulatory lag between sandbox testing outcomes and formal legislative enactment, and the absence of structured mechanisms to support post-sandbox scalability. While the demonstrated benefits of regulatory sandbox experimentation are significant, their long-term impact and sustainability could be substantially enhanced by establishing an integrated, inter-agency governance framework and institutionalising explicit scaling pathways.

## 5.2 Contributions to Policy and Practice

This research presents a validated comparative analytical framework for assessing sandbox effectiveness across diverse sectors, providing policymakers with a structured approach to design and implementation. The findings offer actionable, evidence-based policy mechanisms, including a "Sandbox-to-Statute" roadmap to accelerate the transition of successful experiments into permanent law, as well as a Post-Sandbox Scaling Pathway to guide innovators beyond the testing phase<sup>49</sup>.

For practitioners, the analysis identifies critical success factors for sandbox participation, emphasising the importance of operational transparency, proactive multi-stakeholder engagement, and a clear strategy for post-sandbox market integration. Ultimately, this research report repositions regulatory sandboxes from isolated exemptions to strategic levers for systemic innovation, directly linking agile governance to long-term national social and economic competitiveness.

<sup>48</sup> World Bank. (2020). *Global Experiences from Regulatory Sandboxes in Fintech*. Washington, DC: World Bank.

<sup>49</sup> Organisation for Economic Co-operation and Development (OECD). (2021). *The OECD Framework for Regulatory Policy Evaluation*. Paris: OECD Publishing.

## 5.3 Strategic Roadmap: Next Phase of NRS in Health, Mobility, and Digital Economy

The next phase of the NRS must focus on integration, scaling, and future-proofing. For digital health, the immediate priority is the successful passage and implementation of the Digital Health Act 2026, informed by the OHS RegLab legacy. The sandbox should evolve to test more complex AI-driven diagnostics and integrated care models, with a focus on data interoperability and ethical governance of AI.

Malaysia's autonomous vehicle (AV) strategy should progress decisively from experimental testing to phased commercial deployment by formalising key operational zones such as Cyberjaya, Putrajaya, and Iskandar Puteri. These hubs would host early commercial services, including eMoovit, robotaxis, and autonomous shuttles serving as permanent regulatory testbeds. Legal gazettal is vital for institutionalising governance, standardising safety protocols, and aligning with Malaysia's intelligent transport ecosystem.

To ensure safe and scalable deployment, MIROS, Futurise, the Ministry of Transport, the Public Works Department (JKR), and local government authorities should jointly lead a coordinated infrastructure upgrade encompassing AV-specific signage, sensor-compatible lane markings, smart intersections with Vehicle-to-Infrastructure (V2I) systems, and dedicated drop-off and charging stations. Establishing centralised command and data management centres will further enhance operational oversight. Concurrently, legislative refinements must clarify cross-border liability, data governance, and insurance frameworks to support ASEAN-level integration. A phased rollout, starting with controlled AV corridors in Cyberjaya, will be followed by expansion to Putrajaya and Iskandar Puteri, positioning Malaysia as a regional leader in autonomous mobility governance and infrastructure readiness.

## 5.4 Research Limitations and Future Research Directions

This research report analysis is limited by its focus on two flagship case studies within a broader NRS portfolio and its reliance on qualitative methodology. While the findings offer substantial depth, they may not be universally generalisable across all sandbox types. Future research should employ longitudinal and quantitative methods to track the long-term economic performance and societal impact of companies that have graduated from sandbox environments.

A critical area for future inquiry is the political economy of regulatory sandboxes, specifically investigating power dynamics, equity of access for MSMEs, and the distributional consequences of sandbox-facilitated innovations to ensure that the benefits of technological change are broadly shared across Malaysian society.

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