

# Determinant of Sandbox Hospital Adoption in Southeast Asia

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## Abstract

**Introduction:** The adoption of regulatory Sandbox Hospitals in the Association of Southeast Asian Nations (ASEAN) region presents a unique opportunity for innovation and improves healthcare delivery. Sandbox Hospital is a conceptual health facility offering a wide range of medical services while fostering research and innovation within the healthcare facility. **Objective:** This scoping review aims to identify and analyse the key success determinants of regulatory Sandbox Hospital adoption within the ASEAN context. **Methods:** Utilizing the PRISMA-ScR guidelines, a comprehensive search was conducted across various databases. **Result:** A total of 45 literatures were obtained, revealing notable variations in the implementation processes and practices of Sandbox Hospitals among ASEAN countries, highlighting the diverse contexts and healthcare needs across the region. **Discussion:** Key success factors identified include robust policy frameworks, strong institutional readiness, a vibrant innovation ecosystem, strategic technology investments, continuous learning, and effective scaling up. Policies and entrepreneurs play crucial roles in navigating the political and administrative landscapes that influence adoption. Technological readiness, including interoperability, digital maturity, and cybersecurity, is vital for maintaining sandbox integrity. **Conclusion:** Policy support, institutional capacity, stakeholder engagement, and cultural context significantly influence the implementation and outcomes of Sandbox Hospitals across ASEAN.

**Keywords:** Digital Determinant, Sandbox Hospital, Southeast Asia, Digital Health

## 1. Introduction

### 1.1 Background of the Study

The concept of a regulatory sandbox originates from the financial technology sector, where it serves as a controlled environment specifically designed for testing and validating innovative products, services, or business models, all while operating under the scrutiny of a recognised regulatory authority(1). Sandbox Hospital is a conceptual health facility offering a wide range of medical services within a comfortable and innovative environment. By integrating the latest health technologies, these hospitals prioritize delivering the highest quality of patient care while fostering research and innovation to enhance safety. Applications such as digital therapeutics, artificial intelligence-driven diagnostic tools, and remote patient monitoring systems are few examples of Sandbox Hospital(2). In today's world, sandbox hospitals

must support the gathering of data for unproven health technology innovations in real-life settings, all while prioritizing patient safety, adhering to regulatory requirements, and minimizing unnecessary risks(3).

ASEAN (Association of Southeast Asian Nations) is a regional organization composed of 10 countries in the Southeast Asia region including Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. In diverse regions like ASEAN, the variability in healthcare systems underscores the importance of adaptable solutions(4). The relevance of adopting Sandbox Hospitals within ASEAN countries is heightened by the region's diverse healthcare infrastructures, growing investments in digital health technologies, and a favourable policy landscape(5). The surge in digital health initiatives particularly in ASEAN is further propelled by a demographic of young, tech-savvy individuals and increasing Smartphone penetration across the region.(6). Regulatory sandbox mechanisms are essential catalysts for this transformation, allowing for the careful testing of new technologies and services. The disparities in regulatory maturity among ASEAN member states highlight the need to evaluate the success factor in adopting Sandbox Hospital.

The ASEAN region exhibits a distinct array of challenges and opportunities regarding the implementation of regulatory sandboxes in hospitals. The diversity of healthcare systems, spanning from highly digitized institutions in Singapore to under-resourced facilities in Myanmar and Laos, requires insights tailored to specific regions that take into account local contexts, regulatory preparedness, and socio-cultural factors(7). Furthermore, the region is experiencing rapid digitalization, rising healthcare demand, and a surge in public-private health innovation partnerships, making it a fertile ground for sandbox experimentation(3). Most regulatory and innovation frameworks in the region are adapted from Western models, which may not fully align with local health priorities, infrastructure constraints, or policy environments. This disconnect underscores the urgent need for contextualized research that can guide the design, implementation, and scale-up of Sandbox Hospitals in Southeast Asia.

## 1.2 Problem Statement

There is a significant lack of academic literature specifically addressing the implementation of regulatory sandboxes in hospitals within the ASEAN region, despite the growing interest in regulatory sandboxes and digital transformation in healthcare(7,8). Most existing studies either generalize sandbox frameworks explore digital health adoption without dissecting the institutional dynamics within hospital environments(1,9,10). Critical dimensions such as hospital governance structures, clinician engagement, regulatory alignment, and interoperability of health information systems are underexplored in the context of Sandbox Hospital(1,11,12). Moreover, there is limited empirical evidence on the outcomes of Sandbox Hospitals, including their efficacy in scaling innovations, improving care delivery, or fostering sustainable innovation ecosystems(13). These gaps hinder the ability of policymakers and health leaders to design informed, evidence-based sandbox programs tailored to complex healthcare settings.

### **1.3 Study objective**

The study will analyze the critical success factors identified in the existing literature on Sandbox implementation within the ASEAN region. This synthesis offers critical insights for policymakers, hospital administrators, and innovators, enhancing the understanding of Sandbox Hospital models and laying a strong groundwork for future research on successful adoption. Hence, the objective of this scoping review is to identify and analyse the key success determinants of regulatory Sandbox Hospital adoption within the ASEAN context.

## **2. Methodology**

A scoping review utilising PRISMA-ScR guidelines was conducted to identify published papers and reports related to Sandbox Hospital in ASEAN. The study employed a search strategy utilizing various search engines, including PubMed, Scopus, IEEE Xplore, and Google Scholar. The keywords of the search string utilized in the study are enumerated in Table 1. Articles were searched exclusively in English, with publication dates ranging from 2015 to 2025. The search was conducted on 1st April 2025. The records identified were then exported to a local computer (Excel Database) and checked for inclusion by two reviewers (IB and JJ) independently. The inclusion criteria specified that the article must concentrate on the implementation of Sandbox Hospitals, with a primary focus on the ASEAN region. These articles could be scientifically published articles or grey literature (government, institutional, or organisational reports). Excluded from the review were articles that were not related to the healthcare sector. There was no time cut-off in the exclusion criteria. This review employed both primary and secondary screening. Primary screening involved an evaluation of the titles and abstracts of the articles. Secondary screening was done by examining the full articles and those articles which meet the criteria were used in the study. Any disagreements between the two assistance reviewers were resolved through consensus building or discussion. Any duplicated articles or reports were resolved through merging. We did not appraise the methodological quality or risk bias of the included articles or reports. The themes extracted from included articles or reports were mapped by a single reviewer (IB). Extracted themes were then described and discussed in the narrative.

Table 1: Search string used in the study

Database	Search String
PubMed	("Sandbox" OR "Innovation Sandbox" OR "Regulatory Experiment*" OR "Digital") AND ("Hospitals"[MeSH] OR "Hospital*" OR "Healthcare Facilitie*"[tiab]) AND ("Southeast Asia"[MeSH] OR "Indonesia"[MeSH] OR "Thailand"[MeSH] OR "Malaysia"[MeSH] OR "Philippines"[MeSH] OR "Brunei"[MeSH] OR "Myanmar"[MeSH] OR "Laos"[MeSH] OR "Cambodia"[MeSH])
Scopus	TITLE-ABS-KEY ("sandbox*" OR "innovation sandbox" OR "regulatory experiment*" OR "Digital") AND TITLE-ABS-KEY ("hospital*" OR "healthcare institution*") AND TITLE-ABS-KEY ("Southeast Asia" OR "Singapore" OR "Indonesia" OR "Malaysia" OR "Vietnam" OR "Thailand" OR "Philippines" OR "Brunei" OR "Myanmar" OR "Laos" OR "Cambodia")
IEEE Xplore	("sandbox" OR "hospital" AND ("adoption" OR "implementation")) AND ("Southeast Asia" OR "Singapore" OR "Indonesia" OR "Malaysia" OR "Vietnam" OR "Thailand" OR "Philippines" OR "Brunei" OR "Myanmar" OR "Laos" OR "Cambodia"))
Google Scholar	("sandbox") AND ("hospital") AND ("Southeast Asia" OR "Singapore" OR "Indonesia" OR "Malaysia" OR "Vietnam" OR "Thailand" OR "Philippines" OR "Brunei" OR "Myanmar" OR "Laos" OR "Cambodia")

### 3. RESULT AND DISCUSSION

The search yielded an initial result of 24,810 records, comprising 22,400 from Google Scholar, 2,171 from Scopus, 132 from PubMed, and 107 from IEEE Xplore. To ensure data integrity, 230 duplicates were removed using Covidence. An additional 7,238 records were eliminated through the automation tool. Subsequent to this, 12,692 records were excluded for not falling within the specified time frame of 2015 to 2025. A further 4,140 records were removed after an attempt to retrieve them, as 4,297 were found to be unavailable and 43 were not written in English. Following this, the remaining records were assessed for eligibility, resulting in the exclusion of 250 studies due to irrelevance: 150 related to sandbox, 91 to ASEAN, 7 to the healthcare sector, and 1 to implementation, or insufficient references to success. Ultimately, 45 studies were identified as the foundation for the systematic review, and triangulation among the authors was employed to validate the findings collaboratively. Figure 1 is illustrating the PRISMA Flowchart as applied in the study, highlighting the systematic approach taken in the research process.

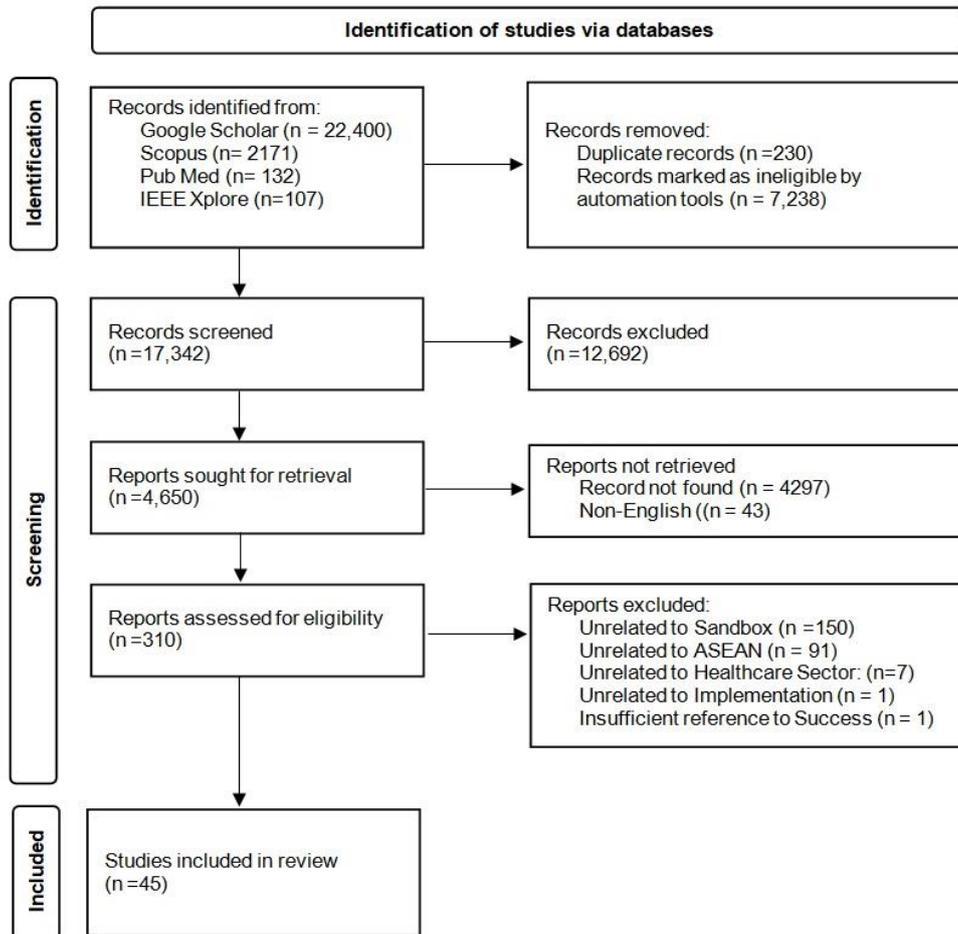


Figure 1: PRISMA Flowchart as applied in the study

## Literature synthesis

We found that notable differences in the implementation processes and practices of Sandbox Hospital among ASEAN, particularly regarding their specific objectives, the overall scope of initiatives, and the outcomes achieved. This variation underscores the diverse contexts and healthcare needs across different ASEAN countries, which affect the application and realization of the Sandbox Hospital approach in practice. Table 2 depicted selected Sandbox Hospital Project in ASEAN.

Table 2 Sandbox Hospital Project in ASEAN

<b>Country</b>	<b>Sandbox Project</b>	<b>Hospital Involved</b>	<b>Focus &amp; Description</b>
<b>Singapore</b>	<b>Mobile Inpatient Care @ Home</b>	National University Hospital Singapore, Khoo Teck Puat Hospital	Launched in 2022, this sandbox enabled virtual ward care at home for conditions like skin infections and CHF. Expanded mid-2023 to include pediatrics and rehabilitation. Achieved about 1,000 patients and 7,000 bed-days saved(14).
<b>Malaysia</b>	<b>Robotic Healthcare</b>	Hospital Tunku Azizah, Rehabilitasi Cheras, Hospital Bera	Launched in 2021, innovators test health robotics solutions (e.g., assistive robots) within hospital settings under NTIS sandbox framework(15).
<b>Thailand</b>	<b>Smart Hospital</b>	Rajavithi Hospital, Rachapiphat Hospital	Launched in 2022, the hospital was equipped to trial AI diagnostics, patient self-check-in, and mobile app integration in a real-world setting(16).
<b>Brunei</b>	<b>Intelligence Hub</b>	Jerudong Park Medical Centre	Launch in 2022, functions as a data-driven sandbox for disease surveillance, digital coordination, and telehealth integration(17).
<b>Philippines</b>	<b>RxBox Digital</b>	Philippine General Hospital	Launched in 2002, RxBox for bedside monitoring (vitals, ECG, SpO <sub>2</sub> ) during COVID-19, later rolled out to selected Rural Health Units(18).
<b>Indonesia</b>	<b>Health Digital Innovation Regulatory Sandbox</b>	Nationwide	Launched in 2023, first for telemedicine (50 providers, 6 progressed); second for medical diagnostics, including wearable and AI-enabled tools. Sandbox on malaria diagnostics; aims to inform regulations for digital health(10)
<b>Vietnam</b>	<b>National e-Health/EHR Telemedicine Initiatives</b>	Nationwide	Launched in 2020, EHR systems standardized (e.g., Medisoft), and telemedicine used for teleradiology, telecardiology(19).

**Success Factors**

Success of Sandbox Hospital adoption in ASEAN, are shaped by various determinant. Policy and entrepreneurs play a crucial role in navigating the political and administrative landscapes that influence adoption. For example, the e-Malaria programs sandbox in Indonesia highlights the significance of stakeholder engagement and governmental support, especially from the Ministry of Health, in addressing knowledge gaps and regulatory hurdles in its adoption(20). Furthermore in December 2023, Indonesia incorporated more than 15 digital health innovations into its health sandbox, featuring notable platforms such as Halodoc and Naluri. Achieving success depends on effectively tackling issues related to data protection and digital infrastructure, particularly in regions with limited technological development. This holds true for Vietnam's experience as well, which shows that although sandboxes foster innovation, they require additional strategies like innovation hubs to be effective(21). In Singapore, the healthcare regulatory sandbox provides a supportive framework that allows for interim authorizations and legislative adjustments, thereby facilitating market entry for innovative initiatives(22). These factors can either facilitate or hinder the implementation. Ultimately, the success of adoption sandboxes will depend on the alignment of various political and administrative components in promoting innovation in healthcare delivery. Table 3 describe success determinant of Sandbox Hospital in ASEAN.

Table 3- Success Determinants of Sandbox Hospital in ASEAN

<b>Domain</b>	<b>Success Determinants (Article)</b>
Policy	Using regulatory flexibility and adaptive frameworks (2) Government policy support (6) Liability clarity, risk governance and mitigation plan(1) Cross-border policy harmonization(23)
Institutional Readiness	Strong leadership and strategic vision (11) Adequate technical, human, and financial resources(9) Organizational adaptability and change culture(5)
Innovation Ecosystem	Multi-sector stakeholder collaboration (13) Public-private innovation partnerships (24) Knowledge sharing and learning networks(23)
Technology	Robust digital infrastructure (6) Interoperability with national systems(25) Compliance with data privacy and cyber security standards
Investment	Venture Capital funding(26) public-private partnerships(13) International aid(24)
Learning, and Scale-Up	Clear performance indicators and evaluation metrics(27) Capacity for real-world data collection and analysis (28) Structured pathways for post-sandbox scaling (21) Feedback loops for continuous improvement(12) Education spending(29)

## Market Outlook

The demand for digital health solutions is escalating. An overview of digital health market in ASEAN is projected to generate US\$7.86 billion in revenue per year in 2025, with an anticipated compound annual growth rate (CAGR) of approximately 8.05%, potentially reaching US\$10.7 billion by 2029(30). Telehealth is a prominent segment within this market, expected to comprise nearly 49% of the market share in 2025 and forecasted to grow at a rapid pace, targeting \$21.8 billion by 2030 with an 18% CAGR(30). Investment trends indicate that, despite a 19% year-over-year decline in digital health funding across the Asia-Pacific region, Southeast Asia continues to attract significant investments(31). Notable examples include Indonesia's Halodoc securing \$100 million in Astra-led Series D funding and Good Doctor raising \$10 million, while Singapore's Doctor Anywhere closed a \$40.8 million funding round in late 2023(30). Singapore's leadership in efficiency is complemented by stable competitiveness in other ASEAN nations such as Malaysia, Thailand, Vietnam, and the Philippines(32). The overall trend in the region suggests a gradual increase in competitiveness.

## ASEAN Digital Master Plan

The ASEAN Digital Master plan 2025 (ADM2025) presents a compelling vision for revolutionizing digital health, emphasizing the creation of sandbox environments tailored for smart hospitals and telehealth ecosystems(4). Member states like Singapore, Malaysia, and Indonesia are leading the charge by establishing innovative digital health sandboxes, enabling them to pilot groundbreaking solutions in patient management, remote monitoring, and electronic health records (EHRs) with confidence and security (33). According to the WHO, only 50% of ASEAN have achieved partial interoperability in national health information systems, with ASEAN promoting HL7 FHIR-based data standards under the ADM2025 to improve this deficit (23)(31). The urgency of this transformation is underscored by the remarkable commitment from over 90 ASEAN companies planning to invest in AI and IoT within healthcare by 2025, an impressive jump from just 40 in 2021 (34). This is not merely a trend, it's a significant shift in the regional landscape. Table 4 described the value proposition based on ADM2025.

Table 4: Value Proposition adopted based on ADM2025

Focus	Impact Area	Value Proposition (Article)
<b>Regional Integration</b>	Cross-border digital services and harmonized data governance	Interoperable health records (7,23)
		Regional Telehealth (5,34) Cross-border patient data exchange(5,35)
<b>mHealth Expansion</b>	Inclusive digital infrastructure for rural and underserved areas	Broader access to Telehealth especially in remote communities(18,28)
<b>Health Innovation</b>	Support for digital innovation, regulatory sandboxes, startup growth	Pilot testing for AI tools and digital solutions(3,36)

<b>Cyber-security</b>	Harmonized cyber-security framework and data protection policies	Sandbox Hospitals to trial health technology(1,8,13) Secure handling of patient data(25,37) Compliance with ethical standards(35,38,39)
<b>Workforce</b>	Digital skills development and capacity building	Enhanced training for healthcare providers in digital tools and health informatics(9,15,33) Better disease surveillance(11,12)
<b>Public Health Resilience</b>	Strengthened regional response and information sharing	Faster pandemic response(6,27,40) Improved health system resilience(41)(42)

**Technological Readiness**

Interoperability is crucial for real-time, cross-platform clinical data exchange. Sandbox Hospitals in Singapore, Thailand, and Vietnam are piloting EHR integration through their health exchanges, enhancing continuity of care for over 1.5 million patients annually (27). Digital maturity indicates the systemic capability of healthcare providers to adopt and maintain digital solutions. Singapore has achieved a score an average above 90% on digital maturity indices, which encompass telehealth, health analytics, and patient portals, while countries like Cambodia and Myanmar remain below 40%, highlighting the region's uneven development. Cyber-security is vital for maintaining sandbox integrity. Unfortunately, digital healthcare sector ranks among the top three industries targeted for cyber attacks in ASEAN (25,37). A 2024 survey conducted by the ASEAN-Japan Cyber-security Centre revealed that fewer than 8% of hospitals in the region allocate more than 10% of their IT budgets to cyber-security (38). Table 5 depicted Technological Trend and Implication Risk in ASEAN. In response, initiatives such as the ASEAN Cyber-security Cooperation Strategy 2021-2025 now require threat intelligence sharing and hospital-specific incident response protocols within sandbox deployments (39). Furthermore, countries like Malaysia and Indonesia project that their national healthcare cyber-security markets will grow at a CAGR of over 20% through 2028, indicating increased investment in digital protection frameworks (36).

Table 5: Technological Trend and Implication Risk in ASEAN

<b>Aspects</b>	<b>Technology Trend</b>	<b>Implication Risk (Article)</b>
Interoperability	<50% of SEA countries have partial health system interoperability	Limits scalability of Sandbox Hospital(31)(23)
Digital Maturity	Diverse: Singapore >90%, while Cambodia <40%	Sandbox models help bridge maturity gaps(32)(43)
Cyber security	<8% of hospitals allocate >10% of IT budget to cyber security	Highlights vulnerability of Sandbox Hospitals(39)(4)

## Policy Support

Singapore and Malaysia have established dedicated sandbox frameworks, including Singapore's Licensing Experimentation and Adaptation Programmed (LEAP), to facilitate real-world trials of digital consultations and AI-based diagnostics under provisional regulatory oversight (35,44). LEAP had supported over 100 telehealth pilots, reflecting the commitment of these states to regulatory flexibility while ensuring patient safety. The combination of policy innovations and startup accelerators, such as Malaysia's MRANTI and Singapore's Startup SG, fosters an environment conducive to Sandbox Hospitals for testing and validating emerging technologies (24).

## Institutional Capacity

Adequate financial and human resources are crucial for the sustainable implementation of pilot technologies in hospital environments. ASEAN governments allocate an average of only 1.2% of GDP to health IT infrastructure, with notable disparities between higher-income nations like Singapore and lower-income countries such as Laos and Myanmar. Singapore has invested over SGD 1.2 billion through its Health Technology Master Plan (HTTMAP), which supports the integration of AI, cloud services, and electronic health records in Sandbox Hospitals. Leadership is equally essential, as digital champions at both institutional and ministerial levels are instrumental in guiding the adoption process. A 2022 WHO Southeast Asia report revealed that hospitals with strong leadership teams are 2.8 times more likely to successfully transition pilot projects into routine operations (26). Furthermore, infrastructure readiness, including broadband connectivity, secure data centers, and integrated hospital IT systems is vital. Initiatives like Thailand's Digital Health Workforce Development Plan and Malaysia's Health Digital Infrastructure Blueprint are addressing these shortcomings by training over 5,000 health IT personnel and upgrading more than 150 public hospitals to enhance digital readiness (5).

## Stakeholder Engagement

Governments play a critical role as regulators and facilitators in aligning sandbox trials with national health priorities. Indonesia's Ministry of Health has successfully integrated Sandbox Hospital findings into its Blueprint for Digital Health Transformation 2024-2030, emphasizing the incorporation of user feedback and clinical insights into national policy (45). Additionally, multi-stakeholder councils, such as Malaysia's National Regulatory Sandbox Committee, ensure that Sandbox Hospital designs maintain a balance between innovation, ethics, and public health objectives (46). Malaysia's MRANTI platform has enabled over 250 health technology startup engagements within Sandbox Hospital trials, effectively connecting innovators with clinical end-users and policymakers.

## Cultural Context

Cultural and contextual factors, including regional diversity, sociopolitical climates, and health-seeking behaviors, significantly influence the implementation and outcomes of Sandbox Hospitals across ASEAN. Countries such as Cambodia and Myanmar encounter systemic barriers, including low digital literacy and limited internet penetration (41,42). In Vietnam, robust political support has facilitated the

integration of digital health into national health policy since 2021, leading to sandbox pilots that incorporate mobile health platforms within public hospitals (29). In contrast, nations experiencing political unrest or fragmented health systems often face delays or resistance in implementing sandbox initiatives(42). Additionally, cultural factors such as trust in digital services, preference for in-person consultations, and language diversity significantly impact patient engagement. A 2022 ASEAN Health Barometer survey indicated that only 42% of patients in Indonesia felt comfortable with remote diagnosis, compared to 76% in Thailand, largely attributable to differing health communication norms and technological familiarity(16). The complex interplay of religious and linguistic variety within ASEAN, comprising numerous languages and dialects, reflects the distinct ethnic backgrounds of its peoples. Therefore, effective sandbox deployment necessitates localized adaptation, culturally sensitive digital literacy programs, and community-based participatory models to ensure equitable and context-appropriate digital health transformation.

## **Benefit**

Regulatory sandboxes in healthcare provide numerous benefits. They facilitate the rapid development and deployment of innovative solutions, accelerating technology readiness for clinical applications(10). Sandboxes offer regulators empirical insights that can improve policy frameworks, enabling iterative updates to licensing guidelines and fostering collaborative policy development(6). Participation in a regulated sandbox enhances a start-up's credibility and attracts investment, leading to significant user growth and substantial funding from major investors.

## **4. CONCLUSION AND RECOMMENDATION**

As conclusion, the success of Sandbox Hospitals in ASEAN hinges on several key determinants: robust policy frameworks, strong institutional readiness, a vibrant innovation ecosystem, strategic technology investments, continuous learning, and the ability to scale up effectively. Embracing these factors is essential for fostering a thriving healthcare environment that can adapt and excel in today's rapidly evolving landscape. By prioritizing these elements, stakeholders can significantly enhance the impact and sustainability of Sandbox Hospitals, ultimately benefiting the entire country.

Regulators across ASEAN must embrace an adaptive regulatory mindset that effectively balances innovation and patient protection. This approach should include the establishment of time-bound, use-case-specific regulatory waivers that facilitate the safe testing of technologies such as AI-assisted diagnostics, remote monitoring devices, and block chain-based health records. Policymakers are encouraged to promote sandbox partnerships between public and private hospitals to ensure that smaller or rural facilities are not disadvantaged in the digital transformation process. Collaborative efforts between hospitals and regulators are essential for the development of ASEAN-aligned health data standards, enabling the sharing and replication of innovations across the region. Furthermore, inclusive stakeholder engagement, incorporating patient communities, civil society, and technology developers, will enhance the social acceptability and contextual relevance of sandboxed solutions.

The study identifies several limitations. Most research is concentrated in digitally advanced nations, such as Singapore, Indonesian, Malaysia, Thailand and Vietnam resulting in the underrepresentation of lower-capacity countries and increasing the risk of their exclusion from the findings. This focus may lead to a skewed evidence base and obscure the operational challenges encountered in less visible settings. Furthermore, inconsistent data standards, varying evaluation metrics, and disparate digital infrastructures impede cross-country comparisons and hinder collective learning.

Future research on Sandbox Hospitals in ASEAN must prioritize in-depth case studies of successful implementations to identify contextual enablers, including leadership strategies, stakeholder engagement, and integration into national health systems. Moreover, testing the theoretical model within the sandbox hospital is needed for bridging the gap between theory and practice. Longitudinal research is essential to track the outcomes of Sandbox Hospitals over time, evaluating clinical and operational impacts, as well as sustainability, scalability, and systemic integration.

## **Ethical Statement**

As this is a systematic review, an ethical statement is not applicable

## **Conflict of Interest**

This study is a component of IB's doctoral thesis in the literature review. The finding presented in this paper is part of a larger research project investigating Sandbox HospitalModel. While this work may contribute to the thesis development, it is also presented as a stand-alone publication to disseminate its findings and insights to a broader audience. This manuscript has never been published in any other journal or duplicated in any way concerned.

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## **Declaration of Generative AI**

The authors declare that no Artificial Intelligence (AI) tools were used in the creation of this article.

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## References

1. Leckenby E, Dawoud D, Bouvy J, Jónsson P. The sandbox approach and its potential for use in health technology assessment: a literature review. *Appl Health Econ Health Policy*. 2021;19:857–69.
2. Fuad A, Tiara A, Kusumasari RA, Rimawati R, Murhandarwati EEH. Introducing a Regulatory Sandbox Into the Indonesian Health System Using e-Malaria as a Use Case: Participatory Action Study. *J Med Internet Res*. 2023;25:e47706.
3. Koycheva L, VandenBroek A. Sandbox Innovation: Potentials and Impacts. *Pract Anthropol*. 2024;46(1):36–45.
4. The ASEAN Secretariat. *ASEAN Digital Masterplan 2025*. 2025;
5. Anshari M, de Pablos PO, Almunawar MN. Digital health in ASEAN an exploratory analysis. In: *Digital Healthcare in Asia and Gulf Region for Healthy Aging and More Inclusive Societies*. Elsevier; 2024. p. 169–98.
6. Sermcheep S. Digital Connectivity in ASEAN: Opportunities and Challenges. *Indo-Pacific and ASEAN*. 2024;(1):197–216.
7. Curtis H, Hogeveen B, Kang J, Le Thu H, Rajagopalan RP, Ray T. *Digital Southeast Asia*. Aust Strateg Policy Inst. 2022;
8. Yefremov A. Regulatory sandboxes and experimental legislation as the main instruments of regulation in the digital transformation. In: *Digital Transformation and Global Society: 4th International Conference, DTGS 2019, St Petersburg, Russia, June 19–21, 2019, Revised Selected Papers 4*. Springer; 2019. p. 82–91.
9. Chikomba A. *From Chaos to Control: Adapting Frameworks for Data Governance in Healthcare Crisis Response*. Open Access Te Herenga Waka-Victoria University of Wellington; 2024.
10. Fuad A, Tiara A, Kusumasari RA, Rimawati R, Murhandarwati EEH. Introducing a Regulatory Sandbox Into the Indonesian Health System Using e-Malaria as a Use Case: Participatory Action Study. *J Med Internet Res*. 2023;25(1):1–15.
11. Mekonnen ZA, Chanyalew MA. Leadership and Governance of Public Health Informatics. In: *Public Health Informatics: Implementation and Governance in Resource-Limited Settings*. Springer; 2024. p. 185–223.
12. Beleg J. Addressing the Digital Divide in Healthcare: Strategies for Equitable Patient Empowerment, FHIR Integration, and Compliance With ISO/IEC 27001. In: *Navigating Privacy, Innovation, and Patient Empowerment Through Ethical Healthcare Technology*. IGI Global Scientific Publishing; 2025. p. 309–32.
13. Singhal S, Kayyali B, Levin R, Greenberg Z. *The next wave of healthcare innovation: The evolution of ecosystems*. McKinsey Co. 2020;
14. Perttu K, Roope L, Miika L, Maaret C, Paulus T. Outreach acute care for nursing homes: an observational study on the quality and cost-effectiveness of the Mobile Hospital. *Age Ageing*. 2025;54(1):afae287.
15. Mahusin N, Sallehudin H, Satar NSM. Malaysia Public Sector Challenges Of Implementation Of Artificial Intelligence (AI). *IEEE Access*. 2024;
16. Kajornkasirat S, Sawangwong C, Puangsuwan K, Chanapai N, Phutthamongkhon W,

- Puttinaovarat S. Integrating AI-Driven Predictive Analytics in Wearable IoT for Real-Time Health Monitoring in Smart Healthcare Systems. *Appl Sci.* 2025;15(8):4400.
17. Slesman C.Y. L and H. Brunei Darussalam in 2022: Towards post-COVID-19 economic recovery, diversification and sustainability. *Southeast Asian Aff.* 2023;53–68.
  18. Arcinas MM, Tolentino MP, Lituañas CRA, Cadelina JS, Obayashi Y. E-health and healthy aging among the participating countries in JST Sakura science exchange program 2019. *Asia-Pacific Soc Sci Rev.* 2020;20(2):13.
  19. Kosowicz L, Tran K, Khanh TT, Dang TH, Pham VA, Ta Thi Kim H, et al. Lessons for Vietnam on the use of digital technologies to support patient-centered care in low-and middle-income countries in the Asia-Pacific region: scoping review. *J Med Internet Res.* 2023;25:e43224.
  20. Hasyim H, Marini H, Misnaniarti M, Flora R, Liberty IA, Elagali A, et al. Evaluation of the malaria elimination programme in Muara Enim Regency: a qualitative study from Indonesia. *Malar J.* 2024;23(1):43.
  21. Bui NH, Ngo KNT. Applications of experimental policy theory (Policy Sandbox) in Vietnam digital economy: The case of Ho Chi Minh City. In: *Conference on contemporary economic issues in Asian countries.* Springer; 2022. p. 313–31.
  22. Cheah S, Pattalachinti S, Ho YP. Blockchain industries, regulations and policies in Singapore. *Asian Res Policy.* 2018;9(2):83–98.
  23. Marcelo AB, Pascual KC, Udayasankaran JG, Allaudin FS, Kijisanayotin B. A framework for regional health information systems interoperability: The Asia eHealth Information Network (AeHIN) experience. In: *Roadmap to successful digital health ecosystems.* Elsevier; 2022. p. 399–414.
  24. Pangarkar N, Vandenberg P. Singapore’s Ecosystem for Technology Startups and Lessons for Its Neighbors. *Asian Development Bank Manila, Philippines;* 2022.
  25. Kandasamy K, Srinivas S, Achuthan K, Rangan VP. Digital healthcare-cyberattacks in asian organizations: an analysis of vulnerabilities, risks, nist perspectives, and recommendations. *IEEE access.* 2022;10:12345–64.
  26. Ingram G. Development in Southeast Asia: Opportunities for donor collaboration. *Cent Sustain Dev.* 2020;1–61.
  27. Dornan L, Pinyopornpanish K, Jiraporncharoen W, Hashmi A, Dejkriengkraikul N, Angkurawaranon C. Utilisation of electronic health records for public health in Asia: a review of success factors and potential challenges. *Biomed Res Int.* 2019;2019(1):7341841.
  28. Kosowicz K. and Khanh, T.T. and Dang, T.H. and Pham, V.A. and Ta Thi Kim, H. and Thi Bach Duong, H. and Nguyen, T.D. and Phuong, A.T. and Le, T.H. and Ta, V.A. L and T. Lessons for Vietnam on the use of digital technologies to support patient-centered care in low-and middle-income countries in the Asia-Pacific region: scoping review. *J Med Internet Res.* 2023;25.
  29. Dang TH, Nguyen TA, Hoang Van M, Santin O, Tran OMT, Schofield P. Patient-centered care: transforming the health care system in Vietnam with support of digital health technology. *J Med Internet Res.* 2021;23(6):e24601.
  30. Statista. Digital Health: market & data analysis. Statista. 2025;(February).
  31. World Health Organization (WHO). Global Digital Health Monitor State of Digital Health Brief. 2025. 1–11 p.
  32. World competitiveness center. IMD World Competitiveness Booklet 2024 World

- Competitiveness Center [Internet]. 2024. Available from: [www.wcceshop.org](http://www.wcceshop.org)
33. Wong BKM, Voon ML, Law FL. Preparing digital citizens for smart healthcare in the Asia-Pacific: Strategies, challenges, and opportunities. *Digit Heal Digit Transform Citiz Empower Asia-Pacific Eur a Heal Soc.* 2025;539–60.
  34. Sermcheep S. DIGITAL CONNECTIVITY IN ASEAN. *Indo-Pacific ASEAN New Balanc New Challenges Asian Integr Stab.* 2024;
  35. Pereira F, Lee B, Fife E. Singapore’s Smart Nation Program and potential lessons for the European Union’s Digital Decade program. In: 32nd European Conference of the International Telecommunications Society (ITS): “Realising the digital decade in the European Union – Easier said than done?” [Internet]. International Telecommunications Society (ITS); 2023. Available from: <https://www.econstor.eu/handle/10419/278012>
  36. Lee W, Kwak J. The Asia-Pacific Region (APAC)’s AI Technology Proliferation and Cybersecurity Cooperation Strategies. *J Platf Technol.* 2024;12(6):28–48.
  37. Marmita S. Struggle of ASEAN in cyber security. *Азия и Африка сегодня.* 2020;(8):52–6.
  38. Christine D, Thinyane M. Cyber resilience in asia-pacific: a review of national cybersecurity strategies. 2020;
  39. Rui W. ASEAN Cybersecurity Policy and China-ASEAN Cooperation. *China Int’l Stud.* 2023;98:55.
  40. Kimura M, Croll P, Li B, Wong CP, Gogia S, Faud A, et al. Survey on medical records and EHR in Asia-Pacific region. *Methods Inf Med.* 2011;50(04):386–91.
  41. Vichana S. Digital Government in Cambodia: Challenges and Solutions. KDI School of Public Policy and Management; 2023.
  42. Madan N. Enhancing digital G2P transfer capacities in Asian LDCs: Findings from Afghanistan, Bangladesh, Bhutan, Cambodia, Lao People’s Democratic Republic, Myanmar, Nepal, and Timor-Leste’. In: *Regional Workshop on Resource Mobilization for Sustainable Development in the Asia-Pacific Countries in Special Situations.* 2021. p. 274–7.
  43. World Intellectual Property Organization (WIPO). *Global Innovation Index 2024: Unlocking the Promise of Social Entrepreneurship.* Geneva: WIPO. 2024;10.34667/t.
  44. Mandyam NK, Lau J, Keck C, Chen E, Yip AW. Scoping review of digital health technologies and interventions that target lifestyle behavior change in Singapore. *Digit Heal.* 2025;11:20552076251337030.
  45. Putri I, Naruetharadhol P. Open innovation’s effects on Indonesia’s digital health market and related societal issues. *Cogent Arts Humanit.* 2025;12(1):2457819.
  46. Wong BKM, Tan MKM, Chua CSW, Kaur M. Ethical and legal considerations in digital healthcare ecosystems: The Malaysian experience. In: *Digital Healthcare, Digital Transformation and Citizen Empowerment in Asia-Pacific and Europe for a Healthier Society.* Elsevier; 2025. p. 287–304.