AI, Digital Health and Cyber Security in Sustainable Development: Literature Review on India and Malaysia

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Abstract: There is a dearth of comparative studies that examine the synergies between digital health, artificial intelligence (AI) and cybersecurity in the context of the Sustainable Development Goals (SDGs) in developing countries. This article highlights the critical issue of the lack of a holistic understanding of the impact of these three domains, known as the digital triad, to realise SDG 3, SDG 9, SDG 10 and SDG 16 in India and Malaysia. The study sheds light on the body of knowledge and problems that have been investigated, and uncovers gaps in the research and areas that lack transferable lessons for middle-income economies on the path to digital transformation. The result shows that, although research on individual domains has been conducted, the interaction between these domains has not been sufficiently addressed, and thus requires an integrated analytical approach that can provide guidance for policy and practice. The term Digital Health refers to the application of information and communication technology (ICT) to enhance health outcomes.

Keywords: Digital Health; Artificial Intelligence; Cyber Security; Sustainable Development Goals; Comparative Analysis

Introduction

The United Nations adopted Sustainable Development Goals (SDGs) are a comprehensive package of 17 interconnected goals for equitable and sustainable development adopted in 2015. Of these, SDG 3 (Good Health and Well-being), SDG 9 (Industry, Innovation and Infrastructure), SDG 10 (Reduced Inequalities) and SDG 16 (Peace, Justice and Strong Institutions) are relevant to the digital transformation agenda of developing economies. Together, known as the digital triad in this study, digital health platforms, AI systems and cybersecurity frameworks could speed the journey to achieving these objectives. But the individual study of these domains has led to an insufficient understanding of the integrated potentialities and the risks with which they are deployed.

The cases of India and Malaysia, both middle-income economies, are very interesting for comparison. With its ambitious Digital India programme, which was launched in 2015, India has aimed to use

technology to promote inclusive governance and service delivery to a population of more than 1.4 billion. Malaysia has taken a unique direction in becoming a leader in the region's digital economy, despite its relatively low population density, with the nation's initiatives, ***Malaysia Digital Economy Blueprint*** and ***MyDIGITAL***, to pursue the path of digital economy. Although these countries have similar development goals, they have very different policy instruments, governance structures and institutional systems, creating a rich set of comparative cases for study.

There are three motivations for this article, which is inspired by the problem statement. First of all, there is a lack of comparative research that explores the convergence of the digital health, AI, and cybersecurity dimensions and their relation with the SDGs. The second is that, despite the interconnectedness of the three domains of the digital triad, little research has been done on their synergy. Third, there is a striking absence of lessons learned that can be transferred to developing countries aiming to use digital transformation to inclusive growth. This article aims to fill these gaps by systematically identifying and analysing the literature on the digital triad and its implications in achieving SDGs in India and Malaysia.

Related Work

Similar work conducted by others in the three aspects of digital triad is introduced in this section. A short overview of the work done in this field is given and followed by the most recent work. The results are compared with the previous work by other researcher in the table 1.

Digital Health and the SDGs

A substantial amount of literature has been developed on digital health and sustainable development. The Global Strategy on Digital Health 2020-2025 by WHO laid the foundation of the use of digital technologies in strengthening health systems, which directly supports SDG 3. The adoption of the ***Ayushman Bharat Digital Mission***, an initiative aimed at establishing a digital health ecosystem across the nation, is emphasized in India. Bhatia and Kumar (2022) found that telemedicine platforms in rural India decreased the travel time of patients by 67 percent and the out-of-pocket expenditure by 40 percent. But there are problems of digital literacy, infrastructure reliability, and data security that hinder scalability.

Malaysian digital health research has been around the ***MySejahtera app*** that was developed from the Covid-19 contact tracing app, providing a comprehensive digital health platform. While Malaysia's smartphone penetration rate is high and around 95 percent, Ismail et al. (2023) had identified issues related to data privacy, algorithmic transparency, and the lack of access for older citizens.

AI for Sustainable Development

Following the *UNESCO Recommendation on AI Ethics 2021*, the research into AI and sustainable development has been increasingly picking up pace. NITI Aayog's National Strategy for AI had referred to three priority sectors as healthcare, agriculture and education. Datta and Singh (2023) have reported on the accuracy of AI-driven diagnostic tools, which were found to be similar to that of experts in the screening for DR and cervical cancer. However, concerns include training data bias and regulatory regulation and transparency of algorithms.

The Malaysia AI Roadmap 2021-2025 and the Malaysia AI Consortium are the key elements of Malaysia's AI governance. The policy-making process is faster in Malaysia due to the Government being centralized, while implementation issues remain in establishing AI talent pools and benefits distribution.

The Law of digital rights and cyber security

Protecting critical infrastructure, protecting personal data and ensuring continuity of digital services, are all essential cybersecurity prerequisites that are part of SDG 16. The IT Act, 2000 of India is deemed as obsolete and thus a proposed Digital India Act is in the works. While India's ITU Global Cybersecurity Index was ranked 10th in 2024, up from 47th in 2018, Sharma and Gupta (2023) highlighted some vulnerabilities in India's digital health ecosystem, such as weak encryption on telemedicine platforms. Malaysia has a cybersecurity policy framework which comprises of the Computer Crimes Act 1997 and Cybersecurity Malaysia as the national agency. Malaysia has an institutional footprint that is concentrated, and has issues in building cybersecurity workforce capacity.

The synergic gap of the existing literature

An in-depth analysis of the literature shows that there are few comparative studies on digital transformation in India and Malaysia. Most comparative research has been to make wider Asia Pacific comparisons. There has been no study yet that has systematically examined the interactions between digital health, AI and cybersecurity as a digital triad. Table 1 compares this work with the related work or previous research by other researchers.

Table 1. Compare this work with the related work or previous research by other researchers

Digital Health	AI	Cybersecurity	Comparative (India & Malaysia)	SDG Framework
Yes	No	No	No	Partial
Yes	No	No	No (India only)	Yes (SDG 3)
Yes	No	Partial	No (Malaysia only)	No
No	Yes	No	No (India only)	Partial
Partial	Yes	No	No (India only)	No
No	Yes	No	No (Malaysia only)	No
Partial	No	Yes	No (India only)	No
Digital Health	**AI**	**Cybersecurity**	**Comparative (India & Malaysia)**	**SDG Framework**
No	No	Yes	No (Malaysia only)	No
Yes	Yes	Yes	Yes	Yes (SDGs 3,9,10,16)

Key Contribution

This article is unique in several respects from the existing knowledge. First, it outlines the concept of the digital triad digital health, artificial intelligence and cyber security and their interconnections as one analytical lens to analyse sustainable development outcomes. This approach is a conceptual shift

from the usual silo-thinking and sees the three domains as interwoven parts of a whole, whose complementarities and conflicts need to be understood in order to design good policies.
Second, this study systematically identified the literature in the three domains in the specific context of comparative research between India and Malaysia, and there are significant gaps in comparative and cross domain research. Third, by comparing the approach of the Indian states with Malaysia's federal administration, the article highlights the transferable lessons for developing countries from the Indian model in terms of decentralisation of the federal level. Third, the article identifies transferable lessons for developing countries by comparing the Indian approach with Malaysia's approach at the federal level, by identifying the transferable lessons in terms of the decentralisation of the federal level. The results indicate that none of the models is universally superior; rather, effectiveness is influenced by contextual variables such as state capacity, digital literacies and institutional maturity.

Method, Experiments and Results

The method and results are discussed. Explanation of the method and the results.

This study use a comparative qualitative approach with selective quantitative approach. The first phase consists of a comprehensive review and analysis of the national digital health strategies, AI policies, cybersecurity laws and SDG progress reports for India and Malaysia. The National Digital Health Blueprint, the NITI Aayog's National Strategy for AI, IT Act, and the proposed Digital India Act, Malaysia's Digital Economy Blueprint, the AI Roadmap 2021-2025, and the Personal Data Protection Act 2010 are some key documents.
The second phase consists of secondary data collection from national statistics, WHO digital health indicators and UN SDG data, ITU Global Cybersecurity Index, and primary data collection through semi-structured interviews with key stakeholders in the health and cybersecurity sector in both countries, including policymakers, health professionals, AI application developers, and cybersecurity specialists. The third phase uses a cross-case synthesis methodology for four parameters: digital infrastructure readiness, AI in healthcare, cybersecurity maturity and SDG alignment. The qualitative data (thematic

coding) is used in the 4th step in NVivo and this is used to contextualise the quantitative information (descriptive analysis).

Discussions

The literature review and comparative framework show the following key findings: First, the potential of synergy of the digital triad is still not fully realized because of institutional fragmentation. The health ministries create the health policy, the technology ministries create the AI policy, and the communication ministries create the cybersecurity policy. This separation makes it difficult to have effective cross domain approaches and regulatory gaps. Second, the government system in place in Malaysia may facilitate faster policy making compared to India, where subnational experimentation may help to develop more contextually relevant policies. A key finding is that there is tension between the efficiency of coordination and the need for flexibility to adapt.

Third, a critical paradox comes about: technologies that are supposed to promote SDGs create new vulnerabilities. AI bias in health diagnostics can further perpetuate inequities (in opposition of SDG 10) and lack of cybersecurity of health information can undermine institutional trust (in opposition to SDG 16). Fourth, common challenges for both the countries include the shortage of human capital, such as AI researchers, data scientists and cybersecurity professionals, to support the digital triad.

Conclusions

Problem statement Addressed/ Motivation: The article aimed to discuss the synergistic interaction between the three domains of digital health, AI, and cybersecurity (3A) and their impact on achieving SDGs in India and Malaysia. In order to properly address the issue of fragmented, domain-specific analysis, a comprehensive literature review was conducted.

Research Method used: A comparative qualitative method was used in this study which included document review, secondary data collection, primary data collection, cross case synthesis and thematic coding using NVivo. The descriptive analysis of quantitative indicators from WHO, ITU and Oxford indices was done.

Key findings: The literature review identified that there has been scholarly interest in each of the domains but that their interconnections have not been studied extensively. Fragmentation of institutions is one of the main obstacles to digital triad governance. The two countries experience a paradox of technologies for promoting SDGs simultaneously generating new vulnerabilities. The lack of skilled human talent for AI and cybersecurity poses a mutual threat that needs investment.

The study has its limitations due to the fact that it is based on available documents and secondary data sources, and it is still continuing to collect primary data. Empirical validation of the digital triad framework by in-depth case studies of specific intersections between digital health, AI, and cybersecurity should be carried out in the future. Longitudinal studies that monitor the impacts of SDG

indicator changes after digital triad policy interventions would add to the evidence base. The framework also needs to be applied to other developing country contexts to determine its generalizability.

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