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Academic Contributions to Policymaking Across the Policy Cycle: A Systematic Review of Malaysian University Research Supporting National Digitalization

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Abstract

This article presents a systematic literature review (SLR) that investigates how digitalization-related research from Malaysian research universities contributes to the policymaking process across six stages of the policy cycle: agenda setting, formulation, legitimization, implementation, evaluation, and review. A total of 30 peer-reviewed articles were analyzed and categorized using the policy cycle framework to uncover the depth and distribution of academic engagement in digital policy development. The findings reveal that research universities contribute most prominently to policy formulation and implementation, offering empirical models, stakeholder analyses, and actionable recommendations in areas such as education, agriculture, healthcare, finance, and innovation. Notably, significant contributions also emerge at the agenda-setting stage, where studies identify policy gaps related to STEM education, digital inclusion, and youth engagement. However, the review highlights a critical absence of academic involvement in the legitimization stage and minimal engagement in policy review, suggesting institutional disconnects that hinder full-cycle policy influence. By applying the policy cycle as an analytical lens, this study offers conceptual clarity and strategic insights into the science-policy interface. It underscores the need for more inclusive, longitudinal, and cross-sectoral mechanisms to translate academic research into sustainable and impactful policy outcomes, especially in developing country contexts like Malaysia, where research-driven governance is essential for national digital transformation.

***Keywords**: Evidence-informed policymaking; digitalization; policy cycle; research universities*

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INTRODUCTION

As nations worldwide accelerate their digital transformation agendas, the role of academic research in shaping evidence-informed policymaking has become increasingly pivotal (Cairney & Kwiatkowski, 2017; Newman et al., 2016). In Malaysia, research universities not only produce scientific knowledge but also play a strategic role in national development by contributing to policies such as the MyDigital blueprint and the Fourth Industrial Revolution (IR4.0) agenda. Hence, the Ministry of Higher Education (MOHE) underscores the importance of aligning university research with national priorities and maximizing societal impact, particularly through its influence on the formulation, implementation, and evaluation of public policy (ISRA Institute, 2025). Despite a strong institutional emphasis on digitalisation, there remains a limited empirical understanding of how academic research on this topic

produced by Malaysian universities influences policymaking across the policy cycle. Although research impact is commonly included in higher education performance metrics, it is often regarded as a general output or outcome rather than as a collection of specific functions integrated within the policymaking process (Boaz et al., 2019). The policy cycle, comprising agenda setting, formulation, legitimization, implementation, evaluation, and review, provides a useful analytical framework for disaggregating these contributions and understanding how academic research interacts with each stage (Howlett et al., 2009; Petak, 2023).

Framing academic outputs through the lens of the policy cycle improves both the explanatory power and diagnostic relevance of research-policy interactions. It allows for clearer distinctions between contributions that shape early problem identification, inform the design of interventions, justify decisions, support on-the-ground implementation, evaluate outcomes, and inform future revisions. Moreover, such analysis enhances our theoretical understanding of knowledge utilization in public policy, especially in the context of digital governance, where research often intersects with infrastructure, ethics, and capacity-building concerns (Cairney & Kwiatkowski, 2017).

This need for a more nuanced understanding is particularly salient in the Malaysian context, in which the performance and contributions of research universities are assessed using science policy tools like the Malaysia Research Assessment (MyRA) by MOHE (Universiti Malaya, 2023) and Research and Development Indicators by Ministry of Science, Technology, and Innovation (MOSTI) (MOSTI, 2021). Therefore, this review analyzes research contributions related to digitalization in several policy areas, including education, health, smart cities, and financial inclusion. Its purpose is to promote alignment with national goals, enhance policy responsiveness, and strengthen the engagement of academia in public governance (Economic Planning Unit [EPU], 2021; Clark & Chataway, 2009).

Research Objective

This research aims to fill an existing gap by systematically reviewing digitalization-related research outputs from Malaysian research universities and mapping their contributions to specific stages of the policy cycle. Specifically, it seeks to:

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1. Analyze how digitalization-related research outputs from Malaysian research universities align with and contribute to different stages of the policy cycle.

2. Evaluate how these research contributions are framed across various thematic policy areas

By doing so, this study aims to elucidate the extent and manner in which academic research informs policy decisions, particularly in the context of Malaysia's aspirations for a thriving digital economy. Understanding how research informs policy across the cycle is critical for bridging the research-policy divide and enhancing evidence-informed policymaking.

This systematic literature review (SLR) is important because it empirically examines the relationship between academic outputs and various stages of the policy cycle, providing a detailed understanding of the science-policy interface in Malaysia. It goes beyond general discussions of "research impact" by analyzing specific policy functions, including agenda setting, formulation, legitimization, implementation, evaluation, and review. By using the policy cycle as an analytical framework, the review adds conceptual clarity and allows for a differentiation of contributions at each stage of the policy process. This enhances both the explanatory and diagnostic power of the review, helping policymakers identify which forms of academic evidence are most influential at different points. For instance, some research may inform agenda-setting through problem identification, while others influence implementation through program evaluations.

Furthermore, the study enriches theoretical understanding of knowledge utilization in digital governance, where research intersects with infrastructure, capacity, and ethics. It also responds to the need for institutional accountability by offering a benchmark for how Malaysian universities can strengthen engagement with government, align research priorities with national agendas, and improve the utility of their outputs. Importantly, this review contributes empirical insights from a developing country perspective. It addresses the literature gap that heavily focuses on OECD countries by offering a localized yet analytically generalizable case of how academic research supports digital transformation policy in a developing country. It also informs capacity-building efforts by suggesting improvements in research training, policy fellowships, and communication strategies to enhance research uptake in policymaking.

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LITERATURE REVIEW

Research Universities in Malaysia and Their Roles in Research and Development for National Digitalization

Malaysia's ambition to become a digitally empowered, knowledge-based economy has placed research universities at the heart of national development strategies. The establishment of five key research universities, namely Universiti Malaya (UM), Universiti Kebangsaan Malaysia (UKM), Universiti Sains Malaysia (USM), Universiti Putra Malaysia (UPM), and Universiti Teknologi Malaysia (UTM) is a deliberate effort to strengthen the country's research capacity and global competitiveness. These institutions are tasked not only with producing high-impact academic outputs but also with contributing to national policies, including the digitalization agenda and the broader science, technology, and innovation (STI) landscape (Ministry of Higher Education Malaysia, 2020).

The National Higher Education Strategic Plan 2020 emphasizes their role in advancing Malaysia's digital transformation. Each university has developed specialized research niches addressing challenges in sectors such as education, healthcare, and manufacturing. Recent national priorities include applied artificial intelligence (AI), as reflected in Budget 2025 allocations (see Table 1). While UM, UKM, USM, and UPM received targeted funding, UTM distinguishes itself by establishing Malaysia's first Faculty of Artificial Intelligence. These universities are also evaluated through MyRA, which promotes policy-relevant research outputs, including policy papers that inform laws, regulations, or strategic plans. This signals the Ministry of Higher Education's expectation that universities act as knowledge brokers, bridging research with public policy and producing research that is both academically robust and socially impactful.

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Table 1:
Research focus on applied AI based on the Malaysia budget 2025 announcement (The Star, 2024)

University	Research on applied AI based on Annual Budget 2025
University Malaya (UM)	Medicine
Universiti Sains Malaysia (USM)	Semiconductors
Universiti Kebangsaan Malaysia (UKM)	AI translation
Universiti Putra Malaysia (UPM)	Quantum computing AI
Universiti Teknologi Malaysia (UTM)	The university is the first in Malaysia to establish Faculty of AI.

Despite this ambition, challenges such as limited funding and weak industry linkages hinder full engagement. Addressing these gaps is vital to translate research into real policy action, particularly in fast-moving domains like digitalization. Unlike traditional academic work, policy research is applied and solution-oriented, integrating stakeholder inputs and mixed methods to inform specific policy issues. It supports evidence-informed policymaking across the policy cycle from agenda-setting to evaluation, and plays a vital role in improving governance, ensuring accountability, and advancing inclusive digital transformation in Malaysia.

The Policy Cycle

The policy cycle offers a structured yet flexible framework to understand how public policies are initiated, developed, implemented, and refined over time. Although often depicted linearly, the cycle is inherently dynamic, involving feedback loops, stakeholder negotiations, and contextual adjustments. It begins with agenda setting, where issues are identified and framed as requiring government intervention. This stage filters societal concerns, influenced by political will, media, advocacy groups, and researchers. Once an issue is prioritized, policy formulation follows. Here, policymakers explore solutions, consult stakeholders, and draft options using analytical tools such as modelling and cost-benefit analysis. This stage is critical for integrating research-based evidence into policy design.

The formulated policy must then undergo legitimization, where it gains formal approval through legislative, executive, or bureaucratic processes. Societal buy-in is also crucial, often shaped by advocacy and participatory mechanisms. Implementation

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translates policy into action, requiring coordination, adequate resources, and administrative capacity. Success hinges on clear directives and ongoing engagement. Next, policy evaluation examines outcomes, efficiency, and unintended impacts through qualitative or quantitative methods, guiding necessary adjustments. Finally, policy review revisits the policy in light of evaluation findings and changing contexts. This stage may lead to policy refinement or renewal, underscoring the iterative nature of policymaking and the importance of continuous learning and adaptation.

Contributions of University Researchers and Academics to Policymaking in National Digitalization

University researchers play a vital role in shaping national digitalization policies by providing empirically grounded evidence through diverse methodologies such as program evaluation, ethnographic studies, and data modeling. Their contributions help policymakers anticipate challenges and design inclusive digital strategies across sectors like education, finance, and governance (Day et al., 2019; Nelson et al., 2024). In Malaysia, research universities are expected to engage beyond academic publication, contributing directly to policy development, particularly in digital public services, smart cities, and digital equity. University research centers also serve as platforms for cross-disciplinary collaboration, supporting innovation ecosystems aligned with national priorities. Academics act not only as evidence producers but also as translators and policy advisors. They bridge the gap between technical research and policy needs, ensuring that digital strategies are both practical and forward-looking.

On the other hand, there are still barriers to effective collaboration between academia and government, and they continue to pose significant challenges. Variations in institutional timelines, decision-making processes, and expectations can impede joint efforts (Ion et al., 2019; Mead, 2015). Furthermore, while research ethics are comprehensively regulated at the participant level, broader ethical responsibilities related to influencing public policy have not been adequately addressed (Spicker, 2007). Addressing these barriers is essential for fully utilizing academic expertise in Malaysia's digital transformation.

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MATERIAL AND METHODS

This study employs a systematic review approach to identify and synthesize prior research related to policymaking, digitalization, and the involvement of academicians in the policymaking process. The purpose of adopting this method is to bridge the gap in the literature concerning the intersection of policymaking and academia, and to examine the continuity of academic contributions from research universities within the policy cycle. To maintain methodological rigor, the study applies the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, thereby enhancing transparency, reliability, and maintaining a focused alignment with the study's objectives.

Identification

The systematic review methodology employed in this study encompasses three key stages to identify relevant and accurate data within the existing body of literature: identification, screening, and eligibility. The selection of keywords was informed by references drawn from dictionaries, encyclopedias, thesauri, and existing scholarly literature. Subsequently, pertinent phrases were utilized to construct search strings tailored for academic databases, including Scopus and Web of Science (refer to Table 2). Following this process, a total of 5792 articles were retrieved from the databases prior to undergoing further screening and refinement.

Table 2:
The Search Strings for Database

Database	Search string
Scopus	(Digital OR Digitalization OR "Information Technology" OR data OR cyber OR "Artificial Intelligence") AND "policy" AND "Malaysia" Access Date: March 2025
Web of Science	(Digital OR Digitalization OR "Information Technology" OR data OR cyber OR "Artificial Intelligence") AND "policy" AND "Malaysia" Access Date: March 2025

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Screening

During the initial screening phase, duplicate entries were deliberately excluded to ensure that only original and non-redundant publications were considered for subsequent analysis. At this stage, a total of 224 articles were systematically assessed. In the second phase, an additional 12 duplicate records were removed, based on a comprehensive set of inclusion and exclusion criteria rigorously developed by the research team. A key inclusion criterion was the emphasis on empirical research articles as the primary source of practical insights. Consequently, publications such as systematic reviews, narrative reviews, meta-analyses, meta-syntheses, book series, monographs, book chapters, and conference proceedings were systematically excluded. Furthermore, the review was limited to literature published in English, reflecting the language's predominant role in scholarly discourse and ensuring analytical uniformity and coherence.

Table 3:
The Selection Criterion in Searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2020 – 2025	< 2020
Literature type	Journal (Article)	Conference, Book, Review
Country	Malaysia	Non-Malaysia
Publication Stage	Final	In Press
Affiliation	UKM; UM; UPM; USM; UTM	Non-research universities

The scope of the review was confined to literature published within a five-year window, spanning from 2020 to 2025. This defined temporal boundary facilitated a focused and contemporaneous evaluation of relevant scholarly work. Ultimately, 30 articles were selected for inclusion, in accordance with the stringent parameters established during the screening process. These rigorous selection standards were implemented to guarantee the inclusion of high- quality, pertinent studies for the ensuing phases of the research.

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Eligibility

The third phase, designated as the eligibility assessment stage, involved the evaluation of a curated set of 212 articles. At this point, a thorough examination of both the article titles and core content was undertaken to ascertain their congruence with the predefined inclusion criteria and their relevance to the overarching research objectives. Following this in-depth assessment, 171 articles were excluded on the grounds that they fell outside the study's scope, bore titles misaligned with the research focus, or contained abstracts that lacked direct relevance to the research aims. Furthermore, this study exclusively analyzes articles affiliated with research universities, specifically UM, UKM, UPM, USM and UTM, by applying an affiliation-based limitation. Consequently, 30 articles were deemed suitable for further analysis (refer to Table 3 for a detailed overview).

DATA ABSTRACTION AND ANALYSIS

An integrative analysis was used as the main evaluative method in this study, aimed at critically examining and synthesizing various research methodologies, including quantitative, qualitative, and mixed-method designs. The primary objective was to identify key topics and subtopics, with the data collection phase serving as the foundation for thematic development. As depicted in Figure 1, the authors conducted a thorough review of 30 selected articles, extracting relevant statements and content that aligned with the study's thematic focus.

Subsequently, key studies concerning contribution of research universities towards policy process were analyzed, with particular attention paid to the research methodologies adopted, their corresponding findings, and the stage of policy cycle that the research contributed. Throughout the analytical process, a comprehensive audit trail was maintained, documenting analytical decisions, interpretive reflections, inquiries, and critical insights to support the interpretive rigor of the study. The resulting thematic structures were then cross-examined to identify potential inconsistencies, which were addressed and resolved through internal deliberation among the research team. This iterative process culminated in the refinement of themes to ensure conceptual coherence and analytical consistency.

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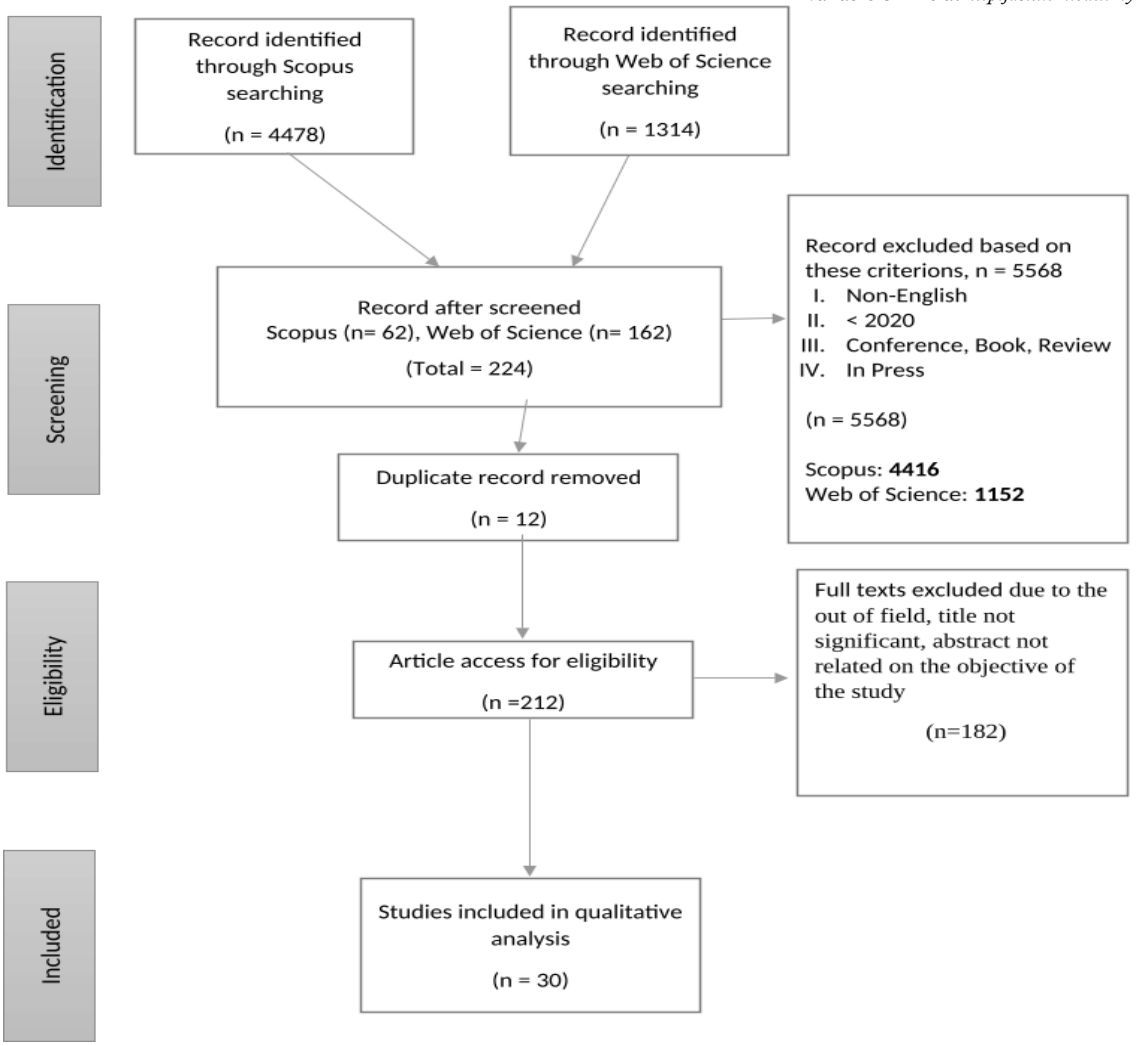

Figure 1: Flow Diagram of the Proposed Searching Study – PRISMA

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FINDINGS AND DISCUSSIONS

The study categorizes the selected articles into the six stages of policy cycle (Table 4).

Table 4:
Research Contribution to Policy According to the Stage of Policy Cycle

Article Title	Methodology	Research Findings	Contribution to Policy Process
Agenda Setting			
Analyzing Enrolment Patterns: Modified Stacked Ensemble Statistical Learning-Based Approach to Educational Decision-Making (Zun Liang Chuan, 2024).	This quantitative study involved 389 urban upper-secondary students in Kuantan District enrolled in the revised KSSM Additional Mathematics syllabus. Data were collected using a modified questionnaire via one-stage cluster sampling and analyzed using statistical methods.	The study found that factors like discipline, ethnicity, gender, self-efficacy, and peer/teacher influence significantly affect Additional Mathematics enrolment, and the proposed ensemble algorithm outperformed traditional models in predictive accuracy at optimal training-test ratios.	The research informed educational policy by highlighting key factors to boost STEM enrolment and guided initiatives that empower educators and counselors to foster STEM careers, with a strong emphasis on promoting gender equality in the field.
Social Media Literacy Among Oil Palm Smallholders in East Malaysia and Association with Oil Palm Integration Practices (Ab Rahman et al., 2021)	This quantitative study surveyed 194 respondents using a random sampling method and a questionnaire adapted from prior research on social media literacy. Data were analyzed using descriptive statistics, t-tests, ANOVA, and logistic regression.	Social media literacy was higher among younger, more educated oil palm smallholders, significantly increasing the likelihood of agricultural integration. However, more effective social media use is needed to fully optimize its benefits for agricultural practices.	The study offers policy recommendations for modernizing oil palm farming in Malaysia, emphasizing the need for broader research involving diverse smallholder populations across regions with varying internet accessibility.
Technology-based Language Learning: Investigation of Digital Technology and Digital Literacy (Alakrash & Abdul Razak, 2021).	This quantitative study involved 150 students and 40 teachers, using two separate questionnaires. Data were analyzed descriptively using SPSS 23.0.	Students used digital technology most for vocabulary and least for reading, while teachers used it mainly for general teaching. Despite high digital literacy, no significant differences were found in technology usage for language pedagogy between the groups.	The findings guide policymakers in designing strategies to integrate digital technologies into language classrooms, particularly for marginalized B40 communities, to enhance equitable access to quality education.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
The Effectiveness of the Use of Information and Communication Technology (ICT) in Rural Secondary Schools in Malaysia	This quantitative study involved 49 respondents (21 students and 28 teachers) from nine rural secondary schools in Kelantan.	Most respondents viewed ICT use positively despite limited facilities and expertise, highlighting the need for targeted ICT training for teachers.	The study provides recommendations for equipping schools and training teachers before new policy implementation and suggests further research on rural students' acceptance of technology to inform inclusive education strategies.
Examining the Factors Affecting Political Information-seeking behavior through Social Media among Youths in Malaysia (N. H. Abdullah et al., 2022).	This quantitative study used a self-developed questionnaire administered to 381 respondents from selected Malaysian public universities through multi-stage sampling. Data were analyzed using structural equation modeling (SEM).	Efficacy, knowledge, and social media significantly influenced political information-seeking among Malaysian youth, while policy satisfaction and motivation had no effect, highlighting the importance of digital engagement in shaping youth political behavior.	The findings are the key drivers of youth political behavior, offering valuable insights for policymakers to strengthen youth participation in Malaysia's democratic process.
Policy Formulation			
A DEMATEL Analysis of the Complex Barriers Hindering Digitalization Technology Adoption in the Malaysia Agriculture Sector	This mixed-method study explored barriers to digital technology adoption in agriculture. Data were collected from 20 professionals including academicians, agricultural officers, and farmer representatives through questionnaires and expert interviews. The findings were analyzed using the DEMATEL framework, following an initial literature review to identify and justify the barriers.	The study found that causes of digitalization barriers in agriculture include lack of skills, technology, cost, infrastructure, and resistance to change, while effects involve locality limits, data concerns, low education, market access, and policy issues.	The study offers policymakers practical recommendations to overcome barriers in digital agriculture, particularly improving infrastructure and financial support, contributing significantly to advancing technology adoption in Malaysia's agricultural sector.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
Survey Data to Unveil the Power of Political Crowdsourcing on social media (Tariq et al., 2024)	This quantitative study collected 472 valid responses through an online survey (Google Forms) conducted between September and November 2021. The survey explored respondents' views on partisanship, social media use, social capital, political participation, and political trust.	The dataset offers useful insights for institutional practitioners and policymakers working in the domains of democracy and political communication, facilitating policy formulation to bolster political trust through collaborative crowdsourcing.	The dataset provides valuable insights for policymakers and practitioners in democracy and political communication, supporting policy agenda aimed at strengthening political trust through collaborative crowdsourcing approaches.
BYOD Implementation Model in Malaysian Schools: The Perception and Readiness of Parents, Schools, and Teachers (Zulaiha Ali Othman, 2020).	This quantitative study involved a two-pronged approach: first, proposing an optimal BYOD implementation model, and second, conducting a survey-based analysis on the perceptions and readiness of schools, teachers, and parents toward BYOD.	Due to BYOD's disruptive nature, most parents' responses leaned negatively on the Likert scale, indicating concerns or resistance toward its implementation in schools.	The study proposes proactive policy recommendations to support the successful implementation of BYOD in schools, addressing challenges and ensuring its effective integration into the education system.
Conceptualizing the Sustainable Energy Security Dimensions of Malaysia: A Thematic Analysis through Stakeholder Engagement to Draw Policy Implications (Shadman et al., 2021).	This qualitative study utilized semi-structured interviews to identify and analyze seven emerging themes related to energy policy. The interviews explored stakeholder perspectives on fossil fuel dependency, renewable alternatives, and energy-efficient technologies, emphasizing the balance between energy equity, security, and sustainability in Malaysia's energy trilemma.	Energy policy decisions depend on ministries and regulators. The study recommends using an indicator mapping process to quantify energy security through the development of a dedicated energy security index.	The study's thematic findings can aid policymakers and energy analysts in designing data-driven energy security policies, particularly in nations with similar energy landscapes and sustainability goals.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
Qualitative Expert Views on the Feasibility of Tele-Counseling Services in Malaysia (A. Y. A. et al., 2020).	This qualitative study involved five local experts in counseling as participants. Data were collected through expert input to explore the feasibility, advantages, and limitations of tele-counseling services.	Thematic analysis revealed three key themes: (i) acceptance of tele-counseling, (ii) its advantages, and (iii) its limitations, providing insights into the feasibility of integrating tele-counseling services in Malaysia.	The findings support integrating tele-counseling as an alternative service in Malaysia's mental health system, while urging policymakers to address implementation challenges to ensure effective and ethical practice.
Sustainability Performance of Multinational Companies in Malaysia (Fazal et al., 2023).	This quantitative study collected data from 252 randomly selected MNC subsidiaries in Malaysia to examine factors influencing international technology transfer and organizational sustainability performance.	The study found that market environment, cultural distance, and absorptive capacity significantly enhanced intra-firm technology transfer, which in turn positively impacted organizational sustainability. These factors also indirectly influenced sustainability through their mediation by technology transfer.	The study offers a reference for policymakers in emerging economies to strengthen policies that foster competitive markets and equip citizens with the education, skills, and cultural awareness needed to boost technological advancement and organizational sustainability.
Big Data Analytics Capabilities, Sustainability Reporting on social media, and Competitive Advantage: An Exploratory Study (Lim et al., 2021).	This quantitative study collected data from 100 public listed firms in Malaysia through questionnaires and content analysis of Facebook pages. Data were analyzed using Smart PLS to examine the relationship between big data analytics capabilities and sustainability reporting.	The study found that Big Data Analytics (BDA) management capability significantly influences sustainability reporting on social media (SRSM), which in turn enhances competitive advantage. It highlights BDA's role in stakeholder communication and strategic digital engagement.	The findings highlight the policy relevance of leveraging Big Data Analytics (BDA) for sustainability reporting via social media, offering strategic insights for policymakers and businesses, with future studies encouraged to explore broader samples.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
Industrial Practices of Collaborative Manufacturing Involving Tool and Die Development: Malaysian Perspective (Selvarajoo et al., 2020)	This quantitative study involved a survey of key players in the local tool and die industry, focusing on operational structures, internal and external collaboration, and the use of collaborative technologies in manufacturing practices.	The study revealed low adoption of collaborative manufacturing (CM) due to poor communication and limited awareness among industry players. Despite available technologies, lack of commitment hindered progress, highlighting the need for greater industry engagement and knowledge dissemination.	Despite limited data, the study provides valuable insights for future research and policy alignment to strengthen the underexplored tool and die industry, supporting its advancement within Malaysia's IR 4.0 framework.
The Impact of Big Data on Firm Performance in Hotel Industry (Yadegaridehkordi et al., 2020)	This quantitative study gathered data from top managers and owners of SME hotels in Malaysia using an online survey questionnaire. Data were analyzed using Structural Equation Modeling (SEM) and Adaptive Neuro-Fuzzy Inference Systems (ANFIS) to assess and prioritize factors influencing big data adoption.	The study identified relative advantage, management support, IT expertise, and external pressure as key factors influencing big data adoption, with technology emerging as the most influential dimension across organizational, human, and environmental contexts.	The study supports policymakers, businesses, and governments in making informed decisions on big data adoption by identifying key influencing factors across technological, organizational, and environmental dimensions.
Antecedent Factors Influencing Teacher's Readiness in Teaching Design and Technology Education (Endot & Jamaluddin, 2023).	This quantitative study surveyed 368 RBT teachers teaching Year 4 KSSR students in Peninsular Malaysia using cluster and simple random sampling. Data were collected through a 114-item questionnaire, with reliability confirmed via Cronbach's Alpha (0.95). Analysis was conducted using SPSS, focusing on self-efficacy, intrinsic motivation, ICT skills, and training support as predictors of teacher readiness.	The study found high levels of reasoning knowledge and SBA skills among teachers, with SBA skills scoring higher. Regression analysis showed that four key factors significantly contributed to 40.4% of teacher readiness, highlighting their importance in curriculum development.	The study offers valuable guidance to policymakers and curriculum planners, particularly the Ministry of Education Malaysia, on assessing and enhancing teacher readiness for the successful introduction of new subjects.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
The Mediating Role of Dynamic Capability on the Relationship between E-Leadership Qualities and Innovation Management: Insights from Malaysia's Medical Ice Industry (Subramaniam et al., 2023)	This quantitative study surveyed 145 respondents from medical device manufacturers in Malaysia using stratified random sampling. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the role of e-leadership in innovation management.	The study revealed that e-leadership qualities significantly influence innovation management, with dynamic capabilities serving as a key mediator. It emphasizes the crucial role of both e-leadership and dynamic capabilities in driving innovation, offering insights for policymakers and practitioners.	The findings help policymakers and managers allocate resources to strengthen innovation management capabilities, supporting Malaysia's national priorities, while contributing new empirical insights on e-leadership in the medical device industry.
Examining the Effect of Interoperability Factors on Building Information Modelling (BIM) Adoption in Malaysia (Ahmed et al., 2024)	This quantitative study collected data from construction firms in Malaysia to validate a model based on the European Interoperability Framework (EIF) and the Technology-Organization-Environment (TOE) framework. Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS.	The study found that BIM adoption is driven by factors like relative advantage, top management, and regulatory support, while barriers include financial and interoperability issues. It offers a comprehensive TOE-EIF model and practical recommendations for AEC stakeholders to enhance adoption.	The study's identified determinants guide organizations in formulating effective policies to enhance Building Information Modelling (BIM) adoption across the Architecture, Engineering, and Construction (AEC) industry.
Policy Legitimization			
-	-	-	-
Policy Implementation			
Ageing Well with Tech: Exploring the Determinants of E-Healthcare Services Adoption in an Emerging Economy (Malarvizhi et al., 2024).	This quantitative study used a cross-sectional design, collecting data from 393 Malaysian respondents through a structured survey with convenience sampling. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM).	Pperformance expectancy, effort expectancy, social influence, and product value significantly influenced intentions to use e-healthcare, while perceived risk had no effect. Facilitating conditions and intentions strongly affected actual usage, with service accuracy showing no moderating effect.	The study informs policymakers on the need to develop supportive policies and infrastructure for e-healthcare, while also guiding educators and practitioners in enhancing digital health literacy and user adoption in public health systems.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
ESL Teachers' Perception and Attitudes Towards the Adoption of Emergency Remote Teaching in Time of Crisis (Junaidi et al., 2022).	This quantitative descriptive study surveyed 124 in-service Malaysian ESL primary school teachers using purposive sampling. Data were collected through an online survey and analyzed descriptively to assess teacher perceptions of Emergency Remote Teaching (ERT).	The study found that most teachers support ERT as an alternative during crises, but challenges like the digital divide persist, highlighting the need for improved infrastructure, resources, and teacher training.	The findings offer critical insights from teachers as policy implementers, aiding policymakers in designing improved e-learning curricula and contingency strategies for crisis-responsive education systems.
E-wallet: Factors Influencing User Acceptance towards Cashless Society in Malaysia among Public Universities (N. Abdullah et al., 2020).	This quantitative study surveyed 400 students and employees from Malaysian public universities in Klang Valley using closed-ended questionnaires. Data were analyzed using descriptive statistics, factor analysis, Pearson correlation, and multiple linear regression with SPSS.	The study identified Performance Expectancy, Social Influence, Facilitating Conditions, and Trust as key factors influencing e-wallet acceptance, with Facilitating Conditions emerging as the most significant driver among Malaysian users.	The findings guide e-Wallet providers and university administrators in enhancing user services and selecting strategic partners, supporting informed policy and implementation of digital payment systems in higher education institutions.
Promoting Sustainable Financial Services Through the Adoption of eWallet Among Malaysian Working Adults	This quantitative study used a cross-sectional design to collect data from 1,156 working adults via a Google Form survey distributed on social media. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 3.1.	The study found that perceived usefulness, ease of use, facilitating conditions, compatibility, and trust significantly influenced both intention and adoption of e-wallets. Intention mediated these relationships, while household income moderated the link between compatibility and usage intention.	The study recommends that eWallet providers and policymakers enhance social influence and consumer security, while addressing the intention-behavior gap by identifying additional behavioral drivers to boost public adoption of eWallet services in Malaysia.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
Experiences of Parents and Teachers with Virtual Classrooms during the COVID-19 Restrictions: A Study Focusing on Inclusive Education in Malaysia (Phua et al., 2022).	This quantitative study collected data from 379 respondents—including parents, teachers, and individuals with both roles—through online questionnaires to gather feedback on inclusiveness in virtual education.	The study found that inclusive remote teaching depends on stable internet, ICT competencies, and strong Ministry of Education involvement. Teachers and parents with higher education levels, especially in science and math, showed greater concern and readiness for inclusive virtual classrooms.	The study informs future digital teaching and learning strategies by emphasizing collaborative involvement of policymakers, researchers, teachers, and parents in creating inclusive and effective educational environments.
Malaysian Researchers on Open Data: The First National Survey on Awareness, Practices and Attitudes (Hodonu-Wusu et al., 2020).	This quantitative study collected data through a survey of 135 researchers from five Malaysian research universities, focusing on their awareness, practices, and attitudes regarding open data and data sharing.	The study found that although researchers are aware of open data, they rarely practice it due to unclear policies, data misuse fears, and publication concerns. It recommends incentives, tools, and guidance to promote open data sharing and future research on reward mechanisms.	The study underscores the need for research that bridges the gap between open data policies and actual practices to foster genuine research transparency and openness in Malaysia.
Participatory Monitoring in Farmer Field School Program through Whatsapp among Indigenous Farmers in Rural Sarawak, Malaysia (Agnese et al., 2024)	This mixed-method study conducted a descriptive analysis of a 182-day WhatsApp Group chat from a farming community, with data collected between September 2019 and March 2020. Data were analyzed using two online software tools to generate visualizations and insights.	The study found WhatsApp-based participatory monitoring effective due to its flexibility and diverse communication formats. Strengths included technical and personal sharing, while limitations stemmed from restricted participation and negotiation tied to role-based group structures.	The study recommends inclusive agricultural policies that ensure equitable ICT access, highlighting social media's role in fostering stakeholder participation while emphasizing the need for complementary non-digital communication in rural areas.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
Policy Evaluation			
Understanding and Acceptance of Smart City Policies: Practitioners' Perspectives on the Malaysian Smart City Framework	This quantitative study used a questionnaire survey and applied Fuzzy Delphi analysis to assess the understanding and acceptance of seven smart city domains. Data were collected from 40 practitioners through a focus group discussion using purposive sampling.	The study found varied practitioner acceptance across smart city domains—high for smart economy, living, people, and governance, but low for environment, infrastructure, and mobility. It underscores the importance of addressing divergent views to develop more inclusive smart city strategies.	This study guides urban policymakers in incorporating public input into local and national smart city strategies.
Compliance with Malaysian Personal Data Protection Act 2010 by Banking and Financial Institutions, a Legal Survey on Privacy Policies (Alibeigi et al., 2021).	This qualitative study conducted a document analysis to assess compliance with specific requirements of the Personal Data Protection Act (PDPA), focusing on the Notice and Choice Principle and individuals' rights. An evaluation model was proposed based on PDPA standards.	The qualitative analysis revealed that the financial sector failed to comply with key requirements of the Personal Data Protection Act (PDPA), indicating significant gaps in regulatory adherence and data privacy practices.	The study offers aligned suggestions and solutions to guide companies in adopting standard privacy policy practices.
Conventional versus Islamic Bank Efficiency: A Dynamic Network Data-Envelopment-Analysis Approach (Azad et al., 2021)	This quantitative study applied a Data Envelopment Analysis (DEA) model, with inputs and outputs selected based on the CAMELS rating system, to evaluate the efficiency of banking institutions.	The study, using a dynamic network DEA model, found Malaysian banks more efficient in generating earning assets than profits. Islamic banks excelled in production and profitability, while conventional banks performed better in intermediation. Efficiency varied across banking functions.	The study informs policies to optimize banking strategies, particularly in balancing asset generation, profit conversion, and intermediation across Islamic and conventional institutions.

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Article Title	Methodology	Research Findings	Contribution to Policy Process
How Technological, Environmental and Managerial Performance Contribute to the Productivity Change of Malaysian Construction Firms	This quantitative study employed a Geometric Young Index (GYI) and Total Factor Productivity Index (TFPI) model, incorporating environmental variables such as firm location and operation type. This approach allowed for a comprehensive decomposition of technological, environmental, managerial, and statistical components affecting productivity.	The study found that TFP changes were driven by technological stagnation, technical efficiency gains, and declining scale-mix efficiency, with environmental efficiency having the strongest impact. Marine firms in East Malaysia showed up to 38% lower productivity, highlighting the need for targeted policy interventions.	The study provides evidence-based insights to inform targeted policies aimed at improving technological, environmental, and operational efficiency.
Factors influencing the adoption of internet banking: An integration of ISSM and UTAUT with price value and perceived risk (Almaiah et al., 2022).	This quantitative study analyzed 362 valid responses from Malaysian e-banking users to examine factors influencing customer satisfaction. Data were evaluated using a Structural Equation Modeling (SEM) approach.	The study found high user satisfaction with online banking services, indicating widespread acceptance of the system within the Malaysian community.	The study offers foundational insights for improving online banking policies and practices locally, with a recommendation for future research to adopt a broader, globally applicable scope.
Policy Review			
Technology adoption in Malaysian schools: An analysis of national ICT in education policy initiatives (Zaiti Zainal & Zaidah Zainuddin, 2020)	This qualitative study employed a discourse analysis approach to examine research on large-scale digital education initiatives in Malaysia, such as the Smart Schools program and Frog Virtual Learning Environment (VLE), focusing on their impact on teachers and students as key stakeholders.	The study provided insights into key factors influencing the success or failure of digital education initiatives, highlighting elements that support or hinder their effective implementation.	The study offers critical insights into factors affecting digital education success, guiding policymakers in planning future education policies that address implementation challenges and enhance stakeholder engagement.

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Agenda Setting

The studies conducted during the Agenda Setting stage predominantly utilized quantitative methodologies which include structured surveys, cluster sampling techniques, and rigorous statistical analyses such as ANOVA, Structural Equation Modeling (SEM), and regression. These methodological approaches provide broad, generalizable insights into emerging issues, yet they sometimes fall short in delivering contextual depth or capturing the nuanced perspectives of various stakeholders. For instance, challenges may arise from limited sample sizes or reliance on self-reported data, which can limit the richness of the findings.

Despite these potential shortcomings, these studies play a crucial role in illuminating emerging policy concerns and public needs. They are strategically positioned at the agenda-setting stage, as they effectively bring to light pressing challenges or gaps in policy, thereby offering compelling evidence for the development of new policy initiatives. The strength of these studies is rooted in their empirical foundation and their relevance to current national agendas, including critical areas like STEM education, digital inclusion, and civic empowerment.

By methodically identifying specific barriers that hinder progress as well as enablers that could facilitate success, these studies assist policymakers in pinpointing where new policies are urgently required. However, it is important to note that the majority of these studies heavily rely on self-reported survey data, leading to potential biases and concerns regarding their generalizability across different populations or contexts.

Policy Formulation

The studies conducted during the Policy Formulation stage employ a combination of qualitative, quantitative, and mixed-method approaches. These methods include structured surveys with statistical modeling techniques such as Structural Equation Modeling (SEM), Partial Least Squares SEM (PLS-SEM), and regression analysis, alongside expert interviews and thematic analyses. This diverse methodology creates a strong evidence base by integrating numerical generalizability with rich contextual insights.

However, some studies face limitations due to small sample sizes or specific sector contexts, which may restrict their broader applicability. These studies contribute to policy formulation by offering actionable recommendations grounded in empirical findings, addressing particular gaps in policy frameworks that either lack detail or require adjustments to account for emerging needs and technologies.

Overall, these studies provide comprehensive diagnostics and strategic entry points for developing responsive and inclusive policies across various sectors, including digital agriculture, education, smart construction, and innovation governance. Their strength lies in translating empirical observations into actionable pathways for reform. Nonetheless, several studies highlight limitations in sample reach or sector representation, indicating a need for expanded research in the future to ensure comprehensive applicability of policies.

Policy Legitimization

In this systematic review, not a single article was classified under the policy legitimization stage of the policy cycle. This absence is noteworthy and highlights a significant gap in the academic literature regarding how digitalization-related research contributes to formal policy authorization processes in Malaysia. Policy legitimization involves obtaining legal, institutional, or public approval for proposed policies, including procedures such as legislative enactment, regulatory endorsement, and formal public consultation (Howlett et al., 2009; Petak, 2023). The scarcity of studies in this area may indicate that academic research in Malaysia has been more actively involved in agenda setting, formulation, and implementation, while having limited visibility or influence on the political and institutional processes that lend legitimacy to policy decisions.

This gap may also reflect the relatively closed nature of legitimization processes in certain governance contexts, where opportunities for academic engagement are restricted or poorly documented. Furthermore, it prompts crucial questions about how research evidence is incorporated (or not) into legislative deliberations, regulatory frameworks, and formal policy justifications. Future research should be encouraged to investigate how university researchers might contribute to or be excluded from legitimization channels, such as parliamentary hearings, white papers, or stakeholder consultations. Understanding these dynamics is essential for strengthening the institutional mechanisms that bridge the science-policy divide and ensuring that evidence-informed policymaking is both technically sound and democratically legitimate.

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Policy Implementation

The studies under the Policy Implementation stage predominantly employ quantitative methodologies, including structured surveys, cross-sectional designs, and descriptive analyses using statistical software such as SPSS and SmartPLS. One study integrates a mixed- methods approach through participatory observation (WhatsApp data), offering rich contextual insights. These methodological approaches are effective for evaluating the acceptability, readiness, and practical execution of policies on the ground, especially in education, digital finance, agriculture, and health domains. However, some studies rely on convenience or purposive sampling, which may limit generalizability but still provide meaningful insights for policy adjustments and refinements. These studies are categorized under Policy Implementation because they assess how policies are applied in real-world settings, examine stakeholder behavior and responses, and identify enablers and barriers to effective execution. Overall, these articles reinforce the need for responsive, inclusive, and adequately resourced implementation mechanisms. While the studies are methodologically robust, their limitations lie in over- reliance on self-reported data and sometimes localized samples. Nonetheless, the value of these studies lies in their ability to bridge policy design with real-world execution, ensuring that intended outcomes are realized effectively and equitably.

Policy Evaluation

The studies under the Policy Evaluation stage utilize a mix of qualitative and quantitative methods, including semi-structured interviews, document analysis, thematic analysis, and Fuzzy Delphi techniques. These approaches emphasize stakeholder perspectives and in- depth contextual exploration, which is essential for evaluating the relevance, efficiency, and equity of existing policies. While these methods provide nuanced insights, they may face limitations in terms of generalizability due to purposive sampling and small sample sizes. These studies are situated within the policy evaluation phase because they assess how existing policies are performing, identify unintended gaps, and propose refinements. Collectively, these studies demonstrate the value of policy evaluation in refining and optimizing existing strategies. Their strength lies in their diagnostic depth and ability to identify sector-specific challenges. However, several rely on expert or institutional perspectives, which might overlook grassroots experiences. This is an area for future research enhancement.

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Policy Review

The studies under the Policy Review stage utilize qualitative methodology, specifically the discourse analysis, which can enrich the understanding of institutional and contextual dynamics. This method allows researchers to reflect on implementation outcomes, stakeholder attitudes, and systemic issues, making them effective for evaluating the alignment between policy objectives and actual practice. This stage involves critical assessment of how well policies have worked and what improvements are necessary. Key implementation challenges such as stakeholder resistance, lack of infrastructure, and ineffective policy communication were identified. These insights underscore the importance of stakeholder engagement and policy design that reflects ground realities. This study emphasizes the significance of continuous policy learning and refinement. They highlight how even well-intentioned policies can falter without institutional support, implementation monitoring, and stakeholder collaboration. While the insights are contextually rich, both studies call for broader empirical follow-ups to test the generalizability of their findings across sectors and regions.

The review indicates that academic contributions are primarily focused on the policy formulation and implementation stages. In these stages, universities provide targeted, evidence-based insights that aid in practical policy design and execution. The agenda-setting phase is also well-represented, demonstrating the role of academia in highlighting new policy issues that align with Malaysia's digital transformation agenda. However, there is a noticeable lack of engagement in the legitimization phase and limited activity during the review stages. This reflects a disconnect within institutions that undermines the full integration of research into the policy process. As a result, there is a risk that technically sound knowledge may be politically sidelined.

To enhance the strategic role of Malaysian research universities in policymaking, the following areas are recommended:

1. Institutionalizing Academic Roles in Policy Legitimization: Universities should establish formal mechanisms such as policy briefs, parliamentary testimonies, or white paper collaborations to bridge the research- legislation divide.
2. Fostering Longitudinal and Cross-Sectoral Evaluations: Researchers should be supported to conduct long-term, mixed-method studies that assess the sustained impact and equity of digital policies.

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3. Promoting Cross-Thematic Integration: Research agendas should be aligned across education, health, governance, and innovation to provide holistic digital policy recommendations.
4. Enhancing Translational Mechanisms: Initiatives such as university-government think tanks, research-to-policy labs, or digital knowledge brokers should be scaled up to mobilize research findings in accessible, policy-ready formats.

CONCLUSION AND LIMITATIONS OF STUDY

Malaysian research universities play a crucial role in advancing evidence-informed digital policymaking. Their contributions are particularly significant during the early and mid-stages of the policy cycle, where they provide valuable diagnostic insights and strategic recommendations. However, to maximize the impact of academic policy research, it is essential to implement systemic reforms that integrate research at every stage of the policy process, from agenda-setting to review. Adopting such an inclusive and iterative approach is vital for Malaysia to develop resilient, equitable, and future-ready digital governance.

One significant limitation of this study is the challenge in verifying if government stakeholders actively utilized the research findings. Efforts were made to reach out to the authors of the articles for further clarification; however, only a few responded. Consequently, this review primarily depends on the published assertions regarding the relevance of the research to policy, which may be more reflective of the researchers' assumptions rather than confirmed outcomes (Oliver et al., 2014). While the articles provide insights into how researchers perceive their contributions to policy, there is a lack of direct evidence regarding the uptake of these findings by policymakers. Despite this, the methodology employed remains valid. Previous research (e.g., Cairney, 2019; Nutley et al., 2019) reinforces the importance of examining how researchers present the policy relevance of their work. This review adds value by capturing the perspectives of Malaysian academics on their roles within the policy process. For future research, it would be beneficial to empirically evaluate policy uptake using methods such as interviews or citation tracking.

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Author contributions

Muhammad Aqil Fikry served as the Graduate Research Assistant for this study. He was responsible for identifying, filtering, and organizing the relevant articles, as well as formatting the manuscript. Siti Hasliah, the project leader, provided overall supervision and guidance. She conducted the core analysis by mapping the selected articles to the stages of the policy cycle. Nor Ashikin, Intan Sazrina, and Raja Marzyani contributed by validating the article-to-policy-cycle mapping and ensuring the analytical framework was consistently and accurately applied.

Conflict of interest

The authors declare that they are affiliated with Universiti Teknologi Malaysia, which is one of the research universities included in this study. To minimize potential bias, the analysis was conducted using publicly available data, and validation of findings was performed collaboratively among all co-authors to ensure objectivity and academic integrity. No external funding or institutional influence affected the interpretation or reporting of the results.

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