

A Thematic Review of Digital Technology Suitability in Improving Inter-Organisational Collaboration Workflows in the Malaysian Public Sector E-Payment Systems

Khairil Faizal Khairi¹, Naharudin Saadan^{2*} & Soliha Sanusi³

¹*Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia, 71800 Nilai, Negeri Sembilan, Malaysia.*

²*Accountant General's Department of Malaysia, Ministry of Finance Complex, 62594 Putrajaya, Malaysia.*

³*Faculty of Economics and Management, Universiti Kebangsaan Malaysia, 43600 Bandar Baru Bangi, Malaysia*

**Corresponding author: nahar.saadan@anm.gov.my*

ABSTRACT

In Malaysia, the adoption of electronic payment systems within public sector agencies has expanded rapidly, reflecting the government's commitment to a cashless and digitally integrated financial ecosystem. Despite this progress, post-collection operations such as fund reconciliation, settlement, and accounting record integration continue to face challenges arising from fragmented workflows, manual verification, and limited coordination among government agencies, acquiring banks, and accounting offices. This study examines the suitability of emerging digital technologies, namely Robotic Process Automation, Artificial Intelligence, Cloud Computing, and Blockchain Technology, in enhancing inter-organisational collaboration workflows within Malaysia's public sector electronic payment systems. Guided by the inter-organisational collaboration framework, which emphasises collaboration, trust, control, and information exchange, a thematic review of 66 scholarly articles published between 2019 and 2025 was conducted. The findings indicate that although Artificial Intelligence and Robotic Process Automation improve operational efficiency and decision making, their adoption is constrained by socio-technical and integration challenges. Cloud Computing promotes interoperability and shared data environments yet raises issues concerning vendor dependency and data sovereignty. Blockchain Technology, however, provides the most resilient inter-organisational workflow through its decentralised and transparent structure that reduces reconciliation delays, strengthens service level compliance, and improves communication among agencies. The study advances conceptual understanding and offers practical insights for policymakers pursuing accountable and interoperable digital ecosystems in Malaysia.

Keywords: Inter-organisational Collaboration Workflow; Electronic Payment Systems; Emerging Technologies; Public Sector; Thematic Review

Received:
August 27,
2024

Revised:
November 6,
2025

Accepted:
November 22,
2025

**Online
Published:**
November 26,
2025

INTRODUCTION

Electronic payment (e-payment) has become a cornerstone of national strategies to promote a cashless society (Fintech Malaysia, 2024). According to Bank Negara Malaysia, the value of transactions carried out via e-payment platforms exceeded RM500 billion in 2024. This trend marks a decisive shift in public preference from physical currency to digital platforms. This progress is also evident in the Malaysian public sector, where over RM60 billion in government collections in 2024 were collected via e-payment (Accountant General Department, 2024). While these figures highlight strong public acceptance of digital platforms, ongoing inter-organisational collaboration (IOC) workflow challenges remain in the back-end e-payment process. These back-end operations involve coordinated processes across public agencies, acquiring banks, and accounting offices. The Auditor General of Malaysia reported recurring discrepancies, noting that more than RM6.0 billion in revenue collected between 2015 and 2022 faced significant fund remittance delays (Jabatan Audit Negara Malaysia, 2022).

In the e-payment ecosystem, IOC workflows are vital for reconciliation, settlement, and record-keeping (Vedapradha & Ravi, 2023). These functions require effective coordination to ensure timeliness, accuracy, and integrity (Gomaa et al., 2023). However, inefficiencies persist, including weak monitoring mechanisms, reliance on manual reconciliation, and fragmented inter-agency communication (Khairi et al., 2025). Such weaknesses undermine service provision stated in service level agreements (SLAs), reducing accountability and organisational performance. The complexity of involving multiple entities across public agencies, banks, and accounting offices further necessitates the effective coordination, transparency, and trust (Rasool et al., 2023). Addressing the challenges in IOC workflows is essential, as delays in fund remittance violate regulatory guidelines. Although digital technologies are increasingly employed to reduce fragmentation, their effectiveness depends on alignment with collaborative requirements within public sector ecosystems (Hummell et al., 2022; Pramuja et al., 2021). This highlights the need to evaluate technological interventions across the four dimensions of IOC: collaboration, trust, control, and information exchange (Kostić & Sedej, 2022; Nguyen et al., 2025). Emerging technologies such as Artificial Intelligence (AI), Robotic Process Automation (RPA), Cloud Computing, and Blockchain Technology (BCT) are recognised as significant enablers of improved IOC workflows (Baio & Hussain, 2024; Khairi et al., 2025; Zhang et al., 2020).

However, numerous studies have explored technological integration to improve inter-organisational collaboration within private sector settings (e.g. Ilin et al., 2017; Wewerka & Reichert, 2023), limited empirical attention has been directed toward public sector ecosystems where structural rigidity, multi-tiered governance, and regulatory compliance amplify collaboration challenges (Mohd Ruzman et al., 2023). Most of the existing research has focused on these technologies in isolation, lacking comprehensive comparative evaluations. Khairi and Saadan (2025) provide one of the few in-depth investigations highlighting persistent IOC workflow challenges in the Malaysian Transport License Department e-payment process. Their study reveals that fragmented inter-agency operations and service-level inconsistencies remain unresolved despite digitalisation efforts. Building upon this context, the present study extends the discussion by evaluating the suitability of emerging technologies such as RPA, AI, Cloud Computing, and BCT within the specific operational realities of the Malaysian public sector e-payment process. By employing a thematic review (TR) approach, the research seeks to identify

trends and synthesise discussions regarding the alignment of these technologies with IOC dimensions. Through evidence-based insights, this study contributes to digital transformation and provides practical guidance for policymakers and system architects, enhancing collaborative governance in the public finance domain.

LITERATURE REVIEW

Inter-organisational collaboration (IOC) has emerged as a valuable framework for examining cross-organisation cooperation among entities involved in complex governance and service delivery systems (Dyer & Singh, 1998). In the public sector, particularly in the context of post-collection e-payment processes, IOC provides a lens for understanding how stakeholders such as government agencies, acquiring banks, and accounting offices interact to achieve accountability and efficiency. Wamba et al. (2024) contend that agencies managing financial operations function within collaborative networks, where success hinges not only on internal efficiency but also on the capacity to coordinate across organisational boundaries. These collaborations are influenced by several elements such as mutual coordination, shared accountability, and technological interdependence (Wiesweg et al., 2022). This study adopts the IOC perspective to evaluate the effectiveness of digital technologies across four dimensions: collaboration, trust, control, and information exchange (Angst & Brandenberger, 2021; Kostić & Sedej, 2022; Oliveira & Lumineau, 2019).

The first element of collaboration is defined as the coordination of processes, activities, and decisions across organizational boundaries to achieve common goals (Adomako & Nguyen, 2023). In e-payment systems, collaboration is essential for effectively managing back-end processes such as reconciliation, settlement, and record-keeping. Ineffective collaboration often results in silos, delays, and accountability gaps, thereby compromising service delivery (Dowelani et al., 2023). According to Gularte et al (2024), successful collaborative governance relies on shared objectives and transparent mechanisms that foster joint problem-solving.

Meanwhile, trust is often considered a fundamental element of IOC workflows, significantly affecting the willingness of the party to share information, delegate responsibilities, and embrace interdependencies (Ansell & Torfing, 2022). In the context of public finance, trust involves the assurance that agencies will operate consistently, adhere to established standards, and maintain data integrity (Anyanwu et al., 2023). According to Lumineau et al. (2021), technological platforms can either enhance or undermine trust based on their transparency, traceability, and security features. The absence of trust can lead to reluctance in information sharing, resulting in bottlenecks and inefficiencies.

Next, control mechanisms serve to enhance accountability, ensure compliance, and manage risk within collaborative networks (Dekker, 2004). This element is associated with agency theory, which focuses on the principal-agent dynamics (Udoikah et al., 2024). They added that, in the public sector, robust oversight mechanisms, such as centralised Treasury accounts, are critical for ensuring transparency. Technological advancements like smart contracts, service level agreement (SLA) tracking, and dashboards improve control by formalising agreements and facilitating real-time monitoring (Nguyen et al., 2023). Nonetheless, a rigid control system can hinder flexibility in dynamic environments (Monsef & Hanan, 2024).

Finally, information exchange serves as a foundational element for all dimensions of the IOC framework. Secure, timely access to accurate data is crucial for informed decision-making (Caglio & Ditillo, 2012). Weigand et al. (2020) characterise communication as "communicative acts" that promote collaboration beyond mere data transfer. Additionally, Angst and Brandenberger (2021) argue that reciprocal and transparent exchanges not only minimise redundancy but also enhance the quality of decision-making. In the context of e-payment systems, agencies must efficiently access, update, and verify shared records, such as transaction logs. Consequently, effective information exchange platforms emerge as strategic capabilities for organisations.

Emerging technologies such as RPA, AI, Cloud Computing, and BCT present significant opportunities to enhance various dimensions of the IOC framework. RPA fosters consistency through the automation of reconciliation tasks, while AI aids in predictive analytics and informed decision-making. Cloud platforms facilitate shared access to data and resources, and BCT ensures transparency and data integrity (Bhurgri et al., 2024). Collectively, these technologies enable synchronised operations across geographically dispersed institutions, underscoring the critical role of digital infrastructures in fostering resilient collaborations (Omol, 2024; Sanusi et al., 2022). However, the effectiveness of these technologies is contingent upon contextual factors. The OECD (2025) highlights that digitalisation can enhance efficiency and interoperability only when supported by robust governance, institutional readiness, and contextual alignment (Ganeshu et al., 2024; Mittal & Gautam, 2023).

In conclusion, no single technology can be deemed universally optimal for inter-organisational collaboration. Each technology possesses unique strengths and limitations, with its effectiveness influenced by contextual and institutional factors. This highlights the necessity for comparative evaluations that extend beyond mere technical efficiency, assessing alignment with collaborative imperatives. By mapping IOC dimensions such as collaboration, trust, control, and information exchange against the capabilities of emerging technologies, this study establishes a structured framework for evaluating their suitability. This analytical perspective sets the stage for the subsequent thematic review, which explores the integration of digital transformation with collaborative governance in public sector financial management.

METHODOLOGY

This study adopts a thematic review (TR) approach, which differs from conventional systematic reviews by prioritising interpretive analysis over outcome synthesis. Rather than merely evaluating prior research findings, TR facilitates deeper exploration of patterns, concepts, and frameworks IOC workflows. The approach is grounded in the TR framework proposed by Zairul (2020, 2021) and Zairul and Zaremohzzabieh (2023) which adapts Braun and Clarke (2006) thematic analysis for literature synthesis. The process involved identifying, coding, and organising recurring patterns, which were subsequently developed into analytical themes concerning the suitability of emerging technologies in enhancing IOC within e-payment systems. To ensure rigour, the review focused on publications from 2019 to 2025, sourced primarily from SCOPUS and Mendeley, and retrieved using targeted keywords related to technological integration, collaboration, and e-payment workflows as outlined in Table 1.

Table 1
Databases' Search Terms

Database	Selection based on string criteria	Result
SCOPUS	TITLE(("blockchain" OR "distributed ledger" OR "crypto" OR "ledger technology" OR "cloud computing" OR "cloud" OR "cloud services" OR "virtualization" OR "RPA" OR "robot" OR "robotic" OR "automation" OR "AI" OR "artificial") AND ("public sector" OR "government" OR "public administration" OR "public services") AND ("application" OR "implementation" OR "use" OR "deployment")) AND PUBYEAR > 2019 AND PUBYEAR < 2026 AND (LIMIT-TO (SUBJAREA,"COMP") OR LIMIT-TO (SUBJAREA,"SOCI") OR LIMIT-TO (SUBJAREA,"BUSI")) AND (LIMIT-TO (LANGUAGE,"English")) AND (LIMIT-TO (OA,"all"))	40
Manual selection (Mendeley database)	“blockchain”, “robotic process automation”, “cloud computing”, and “artificial intelligence” were searched in relation to terms including “public sector”, “inter-organisational collaboration” for year [2019 to 2025]	26

Source: Adopted from Zairul and Zaremohzzabieh (2023)

The process of creating a thematic review paper (TR) can be divided into two distinct phases: (1) quantitative and (2) qualitative. The rigorous of this process ensures the trustworthiness of the review by following a structured approach outlined in Table 2.

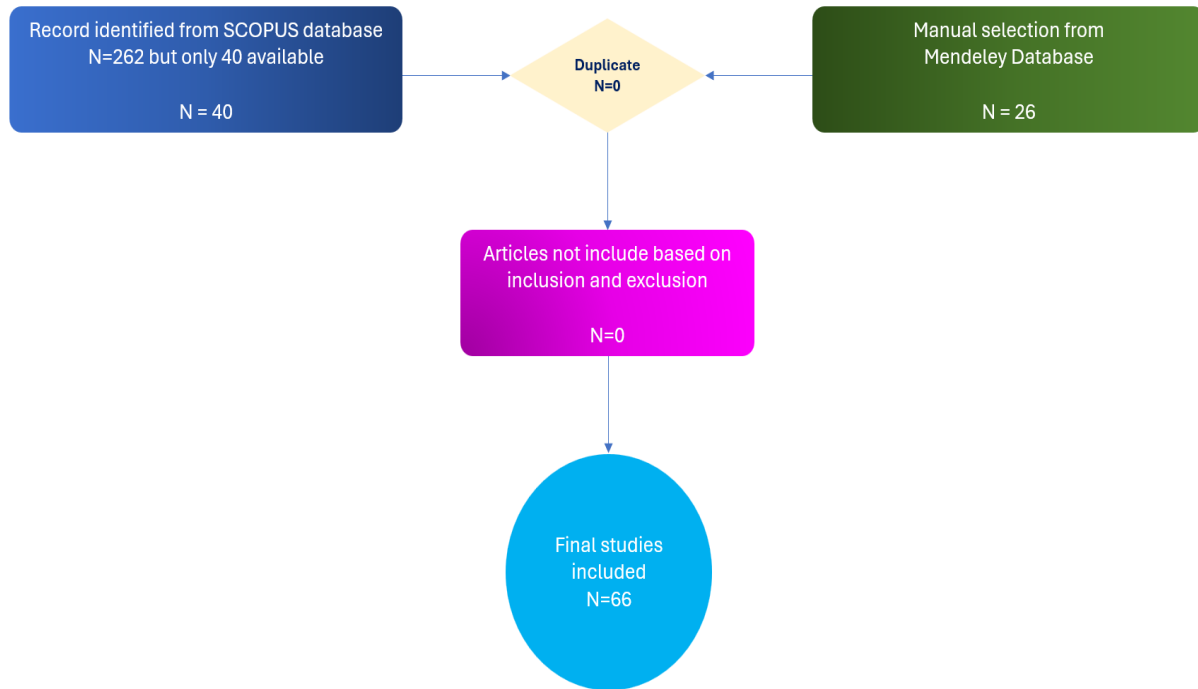
Table 2
Thematic Review Steps

No.	Step	Description
1	Formulating the research questions	Broad questions are defined as a roadmap, ensuring clarity and comprehensive coverage of IOC and technology themes.
2	Article screening	Relevant studies were identified via databases, reference lists, and hand-searching, using precise keywords to balance breadth with practicality.
3	Article filtering	Inclusion and exclusion criteria were applied based on research objectives and emerging insights from initial readings.
4	Cleaning and finalising articles	Metadata was double-checked to confirm relevance and ensure only suitable studies were retained.
5	Data extraction and synthesis	Iterative thematic analysis using ATLAS.ti 25; coding integrated bibliometric insights with qualitative interpretations for depth and consistency.
6	Validation of themes	Themes refined iteratively; peer debriefing and independent review enhanced conceptual clarity, validity, and methodological robustness.

Source: Adopted from Zairul and Zaremohzzabieh (2023)

The selection of articles followed the inclusion and exclusion criteria outlined earlier and depicted in Figure 1. SCOPUS was selected for its extensive coverage of peer-reviewed literature, while Mendeley was used to collate and manage articles from diverse sources (Ahmi et al., 2020). Filters were applied to refine the search by article type, subject area, language, and open-access status. Boolean operators were employed in the Title, Keywords, and Abstract fields using terms such as Robotic Process Automation (RPA), Artificial Intelligence (AI), Cloud Computing, and Blockchain Technology (BCT), alongside complementary terms such as inter-organisational, relational, and collaborative.

Figure 1
Inclusion and Exclusion Criteria in The Thematic Review



Source: Adopted from Zairul and Zaremohzzabieh (2023)

The iterative process ensured broad yet focused coverage of literature on technological interventions in IOC workflows. Duplicates were removed, author details standardised, and metadata verified in Mendeley. A final set of 66 articles was exported to ATLAS.ti 25 for analysis. Two research questions guided the review:

- a) RQ1: What are the patterns and statistics regarding technology applications in IOC workflows within the public sector, particularly in terms of article count, geographical distribution, and thematic development in the literature from 2019 to 2025?
- b) RQ2: What themes emerge from the body of literature on technology applications in IOC workflows within the e-payment process?

RESULT

The reviewed studies highlight evolving trends in adopting emerging technologies to improve IOC workflows in public sector e-payment processes. RPA, AI, Cloud Computing, and BCT each demonstrate unique capacities in addressing challenges such as fragmented operations, manual processes, SLA discrepancies, and communication gaps. Traditionally, manual tasks like reconciliation, compliance monitoring, and data validation, prone to human error and inefficiencies, can be automated to enhance accuracy, security, and transparency. This review

presents findings in two parts: quantitative insights through graphs and statistics, and qualitative themes derived from the literature. Together, they underscore the suitability of digital technologies for strengthening collaborative e-payment workflows.

Quantitative Findings

The study trend considered factors such as publication year, industrial context, research focus, and thematic subjects, revealing patterns of technology application in IOC workflows, thereby answering RQ-1. Figure 2 illustrates the trend of publications on technology applications. The trend of publications on digital technology applications in collaboration studies from 2019 to 2025 demonstrates an upward trajectory. Beginning with a single publication in 2019, the output gradually increased to two in 2020 and three in 2021. A substantial rise occurred in 2022, with nine publications, and accelerated further to fifteen publications, culminating in a peak of 23 publications in 2024. Although the count for 2025 currently stands at 13, this apparent decline is likely provisional, as the year is still ongoing. This trend illustrates scholars' interest in applying technology to improve the IOC workflow. This trajectory underscores the growing trend of digital transformation as a vital enabler of IOC workflows.

Figure 2

A Breakdown of Articles by Year of Publication

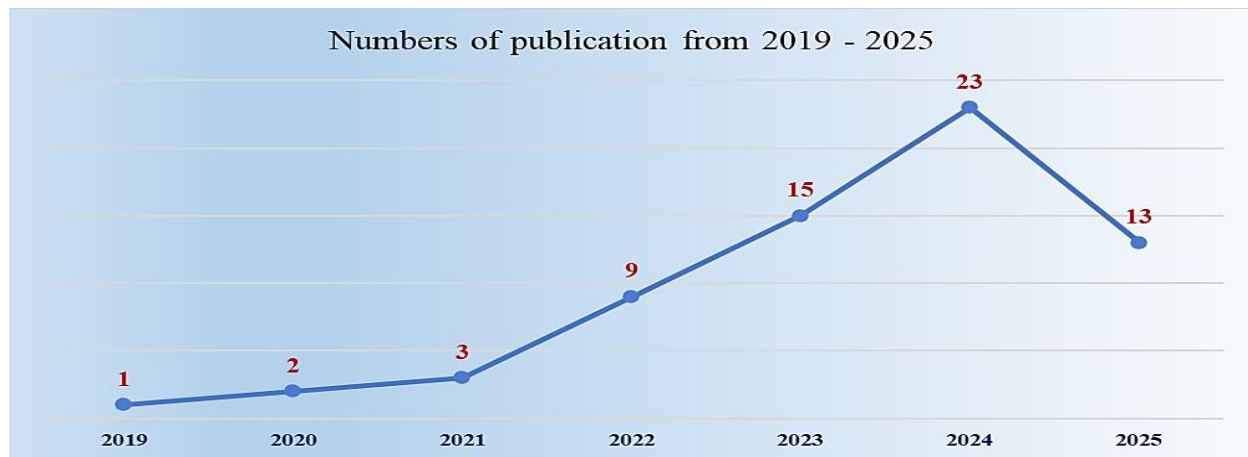
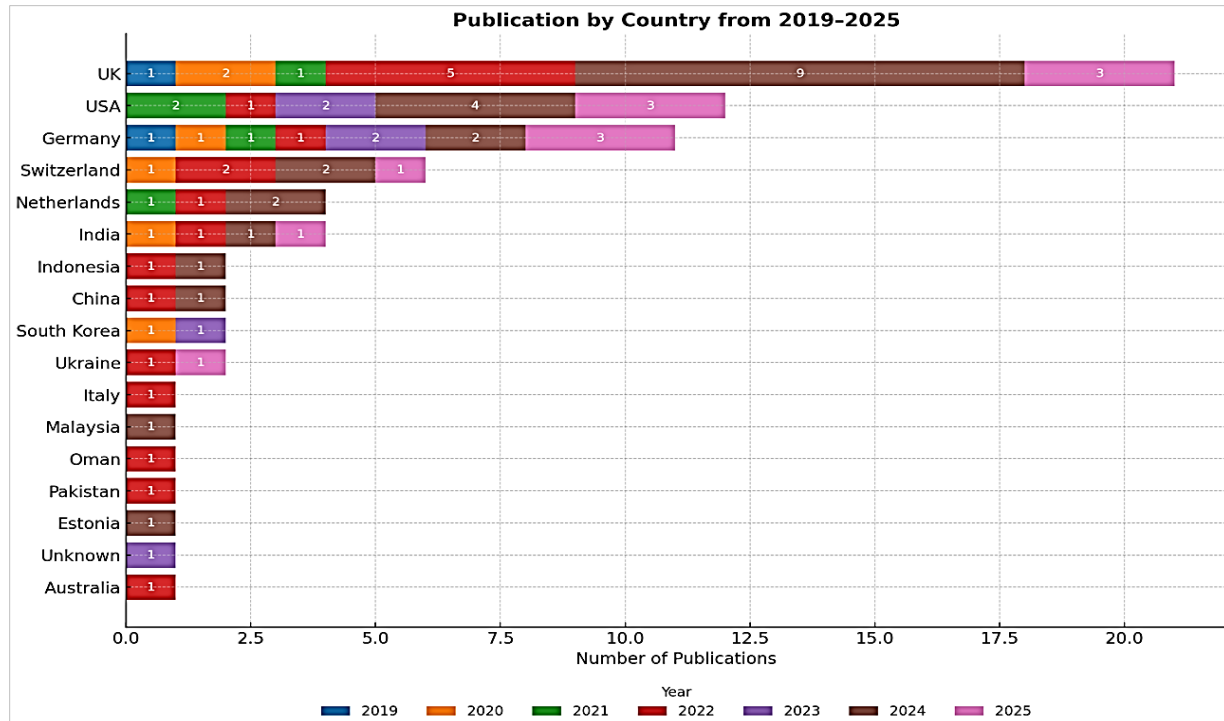


Figure 2 illustrates the publication trends by country on the application of digital technologies in IOC from 2019 to 2025. The United Kingdom recorded the highest volume of publications, with consistent growth across the years and a peak in 2024, reflecting its strong institutional interest in digital public sector transformation. The United States follows closely, with steady contributions from 2020 onwards, driven by academic and governmental initiatives aimed at improving technology interoperability. Germany is positioned in third place, with outputs spanning multiple years, underscoring its continued exploration in digital governance research. Switzerland and the Netherlands also show notable engagement, particularly between 2021 and 2024.

Figure 3
Publication by Country



Meanwhile, emerging economies such as India, China, and Indonesia are beginning to register their presence, reflecting an increasing regional emphasis on collaborative digital governance. Contributions from Ukraine, South Korea, and Malaysia indicate growing diversity in geographic participation. The pattern suggests a gradual global convergence of interest in leveraging technologies like AI, RPA, Cloud Computing, and BCT to support more integrated and transparent IOC workflows.

Table 3 illustrates the theme that emerges in this study. The authors identify four key themes in the application of digital technologies to enhance IOC workflows: T01 – Improving IOC Workflows through Robotic Process Automation (RPA), T02 – Fostering IOC Workflows through Artificial Intelligence (AI), T03 – Strengthening IOC Workflows through Cloud Computing, and T04 – Improving Transparency and Security in IOC Workflows through Blockchain Technology (BCT). The thematic review mapping indicates a growing scholarly interest in AI and Cloud Computing due to their capabilities in intelligent decision-making and data integration. RPA (T01) is frequently explored for standardising the IOC workflows, while BCT is emerging as a secure and transparent solution. Collectively, these themes reflect a shift toward automation, interoperability, and trust-enhancing technologies in inter-entity collaboration. Based on these themes, the author would conduct a comparative assessment to determine the most suitable technology for improving IOC workflows in the context of the public sector e-payment process.

Table 3

Author vs. Theme

No	Author	Themes (*)			
		T01	T02	T03	T04
1	Haq et al. (2025)				/
2	Babšek et al. (2025)			/	
3	Rekunen et al. (2025)			/	
4	Bustamante et al. (2025)				/
5	Paduraru et al. (2025)	/			
6	Alomar and Jacob (2025)			/	
7	Malik and Rana (2025)			/	
8	Binbeshr et al. (2025)			/	
9	Kshetri (2025)			/	
10	Peralta et al. (2025)			/	
11	Mwangi et al. (2025)			/	
12	Ajayi (2025)		/		
13	(Calcara, 2025)		/		
14	Włodyka (2024)			/	
15	Braun and Möller (2024)			/	
16	(Yu, 2024)				/
17	Weitz et al. (2024)			/	
18	Santos et al. (2024)			/	
19	Rico and Laukyte (2024)			/	
20	Li et al. (2024)			/	
21	Yigitcanlar et al. (2024)			/	
22	Mahusin et al. (2024)			/	
23	Kedziora et al. (2024)	/			
24	Kurowski et al. (2024)	/			
25	Bédard et al. (2024)	/			
26	Tomar and Grover (2024)	/			
27	Martínez et al. (2024)			/	
28	Tilbury and Flowerday (2024)			/	
29	Qazi et al. (2024)		/		
30	Akter (2024)		/		
31	Judijanto and Zulfikri (2024)		/		
32	Ogedengbe et al. (2024)		/		
33	Bouabdallah and Fakhfakh (2024)		/		
34	Monsef and Hanan (2024)		/		
35	Rizvi and Williams (2024)		/		
36	Tsouplaki and Kalloniatis (2024)		/		
37	Larikova et al. (2023)				/
38	Luthra et al. (2023)				/
39	Azzam et al. (2023)				/
40	Clifton et al. (2023)				/
41	Mamede et al. (2023)	/			
42	Wang et al., 2023)			/	
43	Behl et al. (2023)			/	
44	Shakeel et al. (2023)			/	
45	Ahmed et al. (2023)		/		
46	William and Mothukuri (2023)		/		
47	Mkhatshwa and Mawela (2023)		/		

No	Author	Themes (*)			
		T01	T02	T03	T04
48	Golmohammadi et al. (2023)		/		
49	Shukla et al. (2023)		/		
50	Nadia Tabassum et al. (2023)		/		
51	Dawood et al. (2023)		/		
52	Khalfan et al. (2022)				/
53	Götzen et al. (2022)	/			
54	Waizenegger and Techatassanasoontorn (2022)	/			
55	Flechsigt et al. (2022)	/			
56	Story et al. (2022)	/			
57	Cadei et al. (2022)			/	
58	Piduru (2022)		/		
59	N'goran et al. (2022)		/		
61	Medara et al. (2022)		/		
62	Hopko et al. (2021)	/			
63	Ban et al. (2021)			/	
64	W. Li et al. (2021)		/		
65	Syed and Wynn (2020)	/			
66	Xu et al. (2020)			/	
67	Agostinelli et al. (2019)	/			

(*) T01- Improving IOC Workflows through Robotic Process Automation (RPA), T02- Fostering IOC Workflows through Artificial Intelligence (AI), T03- Strengthening IOC Workflows through Cloud Computing, T04- Improving Transparency and Security in IOC Workflows through Blockchain Technology (BCT)

Table 4 illustrates the periodical publications and their years of publication from 2019 to 2025, showing that the number of publications exploring emerging technologies in IOC workflows increased significantly. From a single publication in 2019, the output rose to a peak of 23 in 2024, highlighting growing scholarly interest. Notably, 2023 also saw a substantial contribution with 15 publications. Journals such as *Concurrency and Computation*, *Lecture Notes in Computer Science*, and *Computers* featured more than once. The 2025 output, although slightly lower, is expected to increase as the year progresses, maintaining the upward trajectory observed in previous years.

Table 4
Periodical vs. Year of Publications

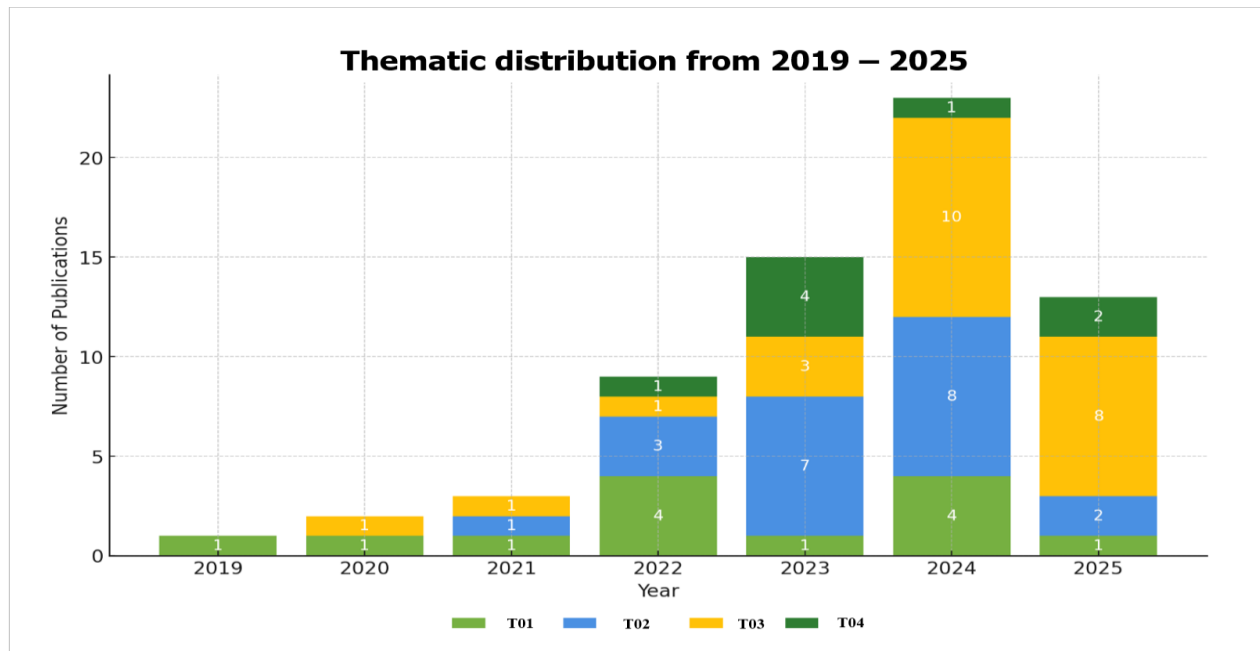
No	Publication Name	Years						Total
		2019	2020	2021	2022	2023	2024	2025
1	ACM Digital Library						1	
2	AI (Switzerland)							1
3	Annals of Operations Research					1		
4	Applied Sciences (Switzerland)					1		
5	Australasian Journal of Information Systems				1			
6	Business Process Management Workshops	1						
7	Cluster Computing					1		
8	Cogent Engineering						1	
9	Computers						1	1
10	Computer Law and Security Review						1	
11	Computers & Security						1	

No	Publication Name	Years						Total
		2019	2020	2021	2022	2023	2024	2025
12	Concurrency and Computation: Practice and Experience				1		1	
13	Conference on Human Factors in Computing Systems - Proceedings						1	
14	Cyber Security Experimentation and Test Workshop			1				
15	Data and Policy						1	
16	Eastern-European Journal of Enterprise Technologies					1		
17	Engineering				1			
18	Frontiers in Blockchain							1
19	Heliyon					2		
20	IEEE Access						1	
21	IEEE Open Journal of the Computer Society							1
22	IEEE Robotics and Automation Letters			1				
23	Indonesian Journal of Electrical Engineering and Informatics (IJEI)					1		
24	Information Services and Use						1	
25	Information Technology and People					1		
26	Intelligent Computing and Optimization for Sustainable Development						1	
27	International Journal for Electronic Crime Investigation					1		
28	International Journal of Engineering Business Management						1	
29	International Journal of Multidisciplinary Research and Growth Evaluation						1	
30	International Journal of Public Sector Management							1
31	International Journal of Research Publication and Reviews							1
32	International Journal of Responsible Artificial Intelligence					1		
33	International Journal of Social Robotics				1			
34	Internet of Things (Netherlands)						1	
35	Journal of Artificial Intelligence & Cloud Computing				1			
36	Journal of Artificial Intelligence General Science (JAIGS)						1	
37	Journal of Cloud Computing			1				
38	Journal of Graphic Era University							1
39	Journal of Purchasing and Supply Management				1			
40	Journal of Software: Evolution and Process						1	
41	KI - Kunstliche Intelligenz						1	

No	Publication Name	Years							Total
		2019	2020	2021	2022	2023	2024	2025	
42	Lecture Notes in Business Information Processing		1						1
43	Lecture Notes in Computer Science				1		1		2
44	Machines							1	1
45	Mathematics							1	1
46	PACIS 2020		1						1
47	Policy Design and Practice					1			1
48	Problems and Perspectives in Management							1	1
49	Proceedings of Science					1			1
50	SciWaveBulletin					1			1
51	Sinergi International Journal of Logistics						1		1
52	Smart Cities						1		1
53	SPE Conference at Oman Petroleum & Energy Show				1				1
54	Springer							1	1
55	Springer Nature							1	1
56	Sustainability (Switzerland)				1				1
57	Symmetry					1			1
58	TalTech Journal of European Studies						1		1
59	Transactions on Emerging Telecommunications Technologies					1			1
60	Transforming Government: People, Process and Policy						1		1
61	Trust and Artificial Intelligence						1		1
62	West European Politics							1	1
Total		1	2	3	9	15	23	13	66

In summary, this section addresses RQ1 by highlighting research trends in the application of several technologies to the IOC workflow within the e-payment process. These trends align with the broader challenges faced by the organisation in managing the IOC workflows across various domains. Furthermore, this study discusses the suitability of each technology in improving IOC workflows (see Figure 4).

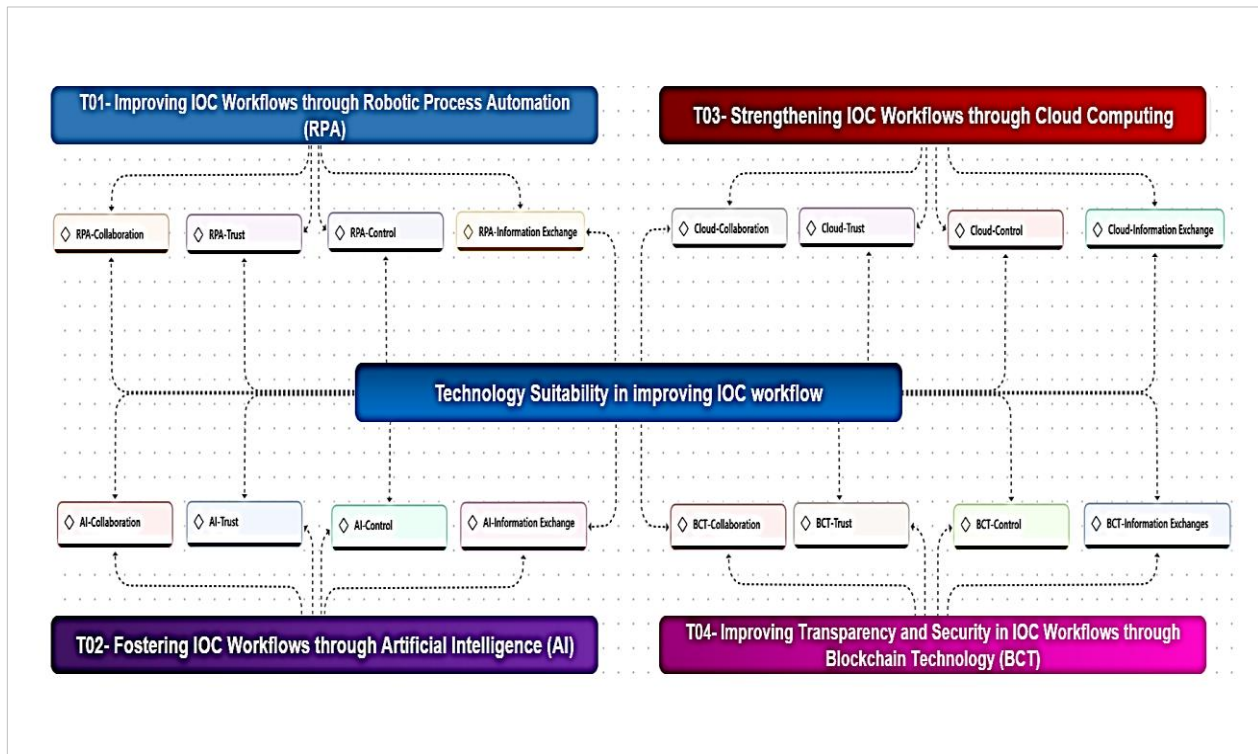
Figure 4
Themes of The Study and Publication Years



Qualitative Findings

This TR paper analysed publications and identified patterns related to the application of emerging technologies in IOC workflows. However, it did not provide specific solutions for integrating technologies into the e-payment process within IOC workflows. Through multiple iterations, initial codes were identified, refined, and organised into categories. Codes that were infrequently referenced and did not align with any specific topic were excluded, as the focus of this study was on aspects that have been thoroughly examined and discussed in existing research.

Figure 5
Overall Network to Answer Research Question 2

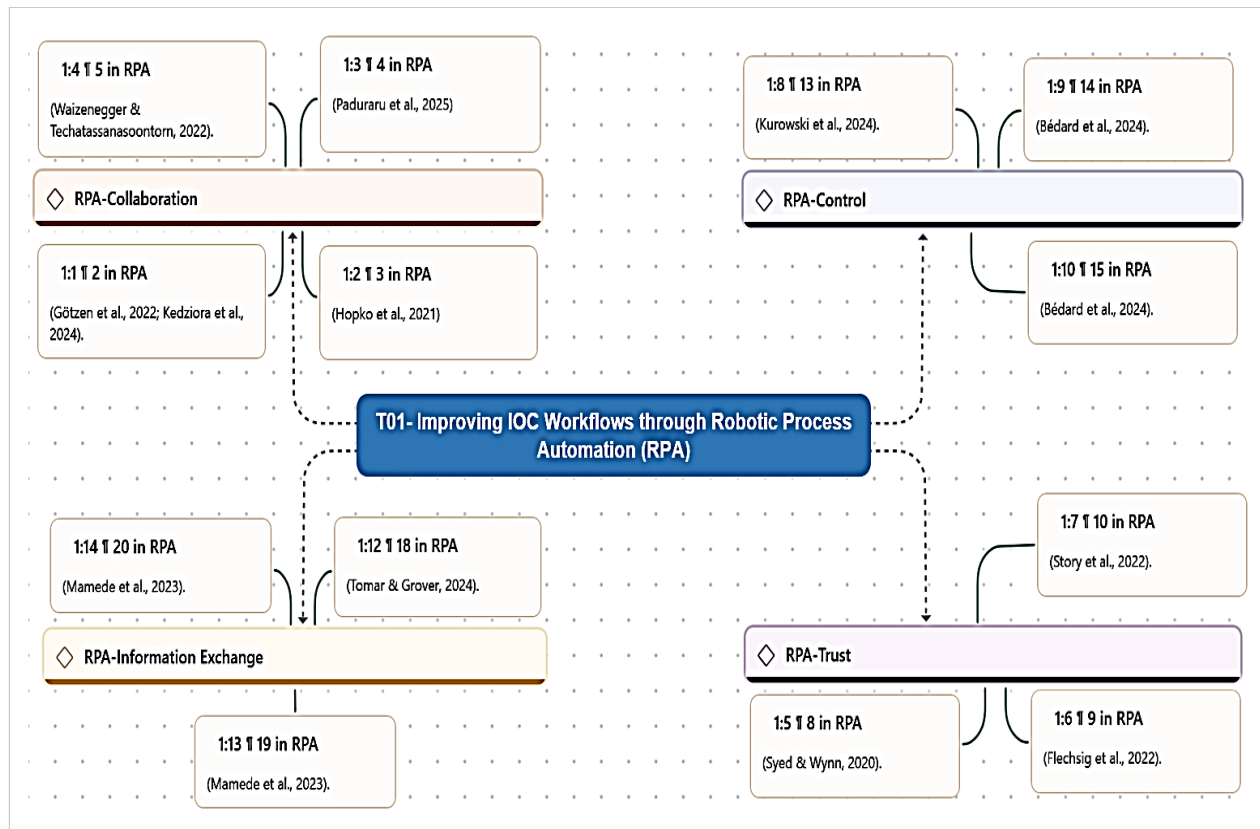


These themes represent distinct yet interrelated technological pathways for addressing inefficiencies, fragmentation, and coordination challenges in IOC workflows in e-payment processes. Each theme is examined in depth in the subsequent sections. Results that fall outside the defined thematic scope or originate from peripheral articles are referenced where necessary to provide descriptive context (see Figure 5).

T01-Improving IOC Workflows through Robotic Process Automation (RPA)

Robotic Process Automation (RPA) is a software-driven automation technology that emulates human action using rule-based algorithms (Agostinelli et al., 2019). In general, RPA is positioned as a natural extension of business operations, offering an alternative mechanism for repetitive tasks that are structured and executed at high volumes (Bédard et al., 2024; Fong et al., 2021). Recently, RPA applications have grown significantly in both the private and public sectors, owing to their capacity to reduce manual errors, enhance process uniformity, and expedite task completion (Moron & Diokno, 2023). In the context of study, RPA holds the potential to transform traditional back-end operations such as reconciliation, validation, and reporting. This study critically examines RPA's suitability through the four dimensions of the IOC framework: collaboration, trust, control, and information exchange (see Figure 6).

Figure 6
T01-Improving IOC Workflows through RPA



From a collaboration overview, RPA contributes to the standardisation of operational procedures across inter-agency boundaries, facilitating more consistent and coordinated workflows. By automating routine and rule-based tasks, it alleviates the administrative burden on human agents, enabling them to focus on strategic, value-added activities such as decision-making and cross-organisational negotiation (Götzen et al., 2022; Kedziora et al., 2024). For instance, in an e-payment process, RPA can streamline inter-agency reconciliation tasks, reducing dependency on manual processes and improving data accuracy. Moreover, the integration of human judgment with robotic precision enhances collaborative task execution in shared environments (Hopko et al., 2021). However, in dynamic operation contexts, RPA deployment may face several challenges. For instance, Paduraru et al. (2025) observe that operational heterogeneity among collaboration entities and the need for rigorous testing environments pose significant barriers to scalability. In addition, Waizenegger and Techatassanasoontorn (2022) highlight that resistance toward automation among employees may hinder smooth integration and collaboration, underscoring the socio-technical complexity of RPA adoption.

Meanwhile, trust is a critical enabler of successful RPA implementation in IOC workflows, where multiple stakeholders must rely on shared digital processes. Transparent communication about the capabilities and limitations of RPA systems is crucial for establishing institutional trust and mitigating resistance to automation (Syed & Wynn, 2020). In the public e-payment process, trust

is demonstrated through the confidence of participating entities, including government agencies, acquiring banks, and accounting offices. Their roles will be executed through automated systems. However, the trust deficit, whether due to poor design, unrealistic expectations, or perceived loss of autonomy, can erode confidence in the collaborative arrangement (Flechsigg et al., 2022; Story et al., 2022). Thus, trust must therefore be deliberately cultivated through participatory design, training, and institutional safeguards that address the human and organisational dimensions of automation.

From a control perspective, RPA enhances operational procedures by uniform process execution and minimising deviations in operational compliance. This procedure is particularly relevant in public sector IOC workflows where transparency, accountability, and auditability are paramount (Kurowski et al., 2024). RPA allows for greater control through codified workflows and audit trails, supporting both operational reliability and policy adherence. Nevertheless, delegating control to software agents introduces new oversight challenges. Bédard et al. (2024) argues that the partial relinquishment of manual control necessitates continuous supervision and capacity-building to ensure that automated processes remain aligned with multi-entity goals.

In terms of information exchange, RPA enhances the velocity and integrity of data flows across siloed systems, which is vital in a collaborative ecosystem (Tomar & Grover, 2024). Through structured interfaces and rule-based triggers, RPA reduces latency and minimises information asymmetry among participating entities. However, systemic limitations, such as legacy IT infrastructure, interoperability issues, and misaligned data standards, can impede the effectiveness of RPA's information exchange (Mamede et al., 2023). These technical and organisational discontinuities must be addressed to unlock RPA's full potential as an integrative tool for information sharing across agencies.

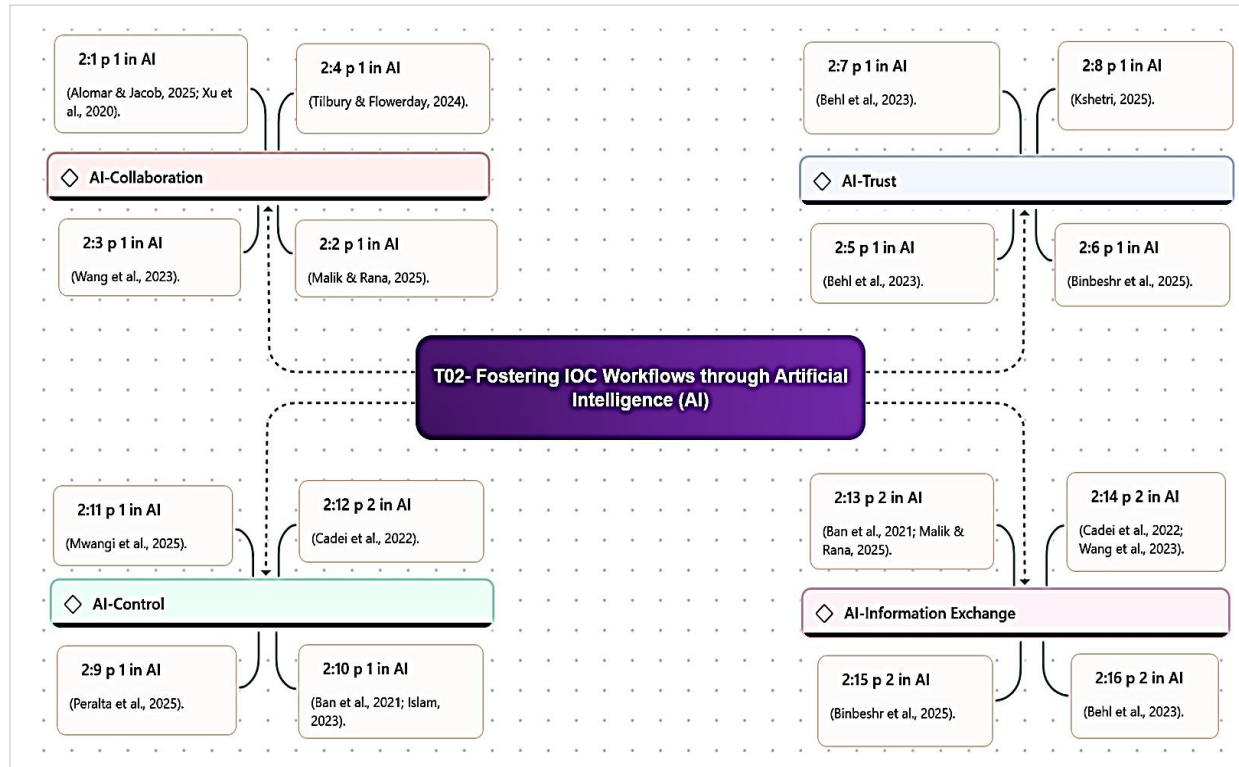
In summary, RPA offers a compelling proposition for enhancing IOC workflows within public sector e-payment systems, particularly through its capacity to standardise workflows, increase trust in automated governance, and facilitate efficient information exchange. However, realising these benefits requires careful implementation, with attention to organisational readiness, stakeholder alignment, and system interoperability. RPA should thus be viewed not merely as a technical solution, but as a socio-technical intervention that intersects with the institutional, behavioral, and relational dimensions of collaborative governance.

T02-Fostering IOC Workflows through Artificial Intelligence (AI)

Artificial Intelligence (AI) has emerged as a strategic technological enabler capable of reshaping the operational dynamics of the IOC workflow, particularly in the public sector e-payment process. Its application across IOC workflows holds considerable promise for enhancing collaboration, trust, control, and information exchange as the core dimensions in this context of study (see Figure 7). However, these benefits are accompanied by several challenges that require critical evaluation, especially in contexts involving multiple institutional actors and shared transactional data.

Figure 7

T02-Fostering IOC Workflows through AI



In terms of collaboration, AI can improve joint decision-making through predictive analytics, optimization algorithms, and scenario forecasting, which support resource planning and risk mitigation across organizations (Alomar & Jacob, 2025; Xu et al., 2020). These features reduce information asymmetries and support the timely alignment of decisions, which is essential in collaborative tasks such as fund settlement and reconciliation. Moreover, AI-driven automation of routine administrative tasks enables personnel in the organisation to engage in strategic functions (Malik & Rana, 2025). Additionally, the AI integration with real-time data enables dynamic information sharing, thereby enhancing situational awareness and reducing delays across distributed agencies (Martínez et al., 2024). However, AI integration is technically complex, necessitating technical changes to existing systems and processes (Wang et al., 2023). Overdependence on AI may also lead to reduced interpersonal collaboration and the erosion of critical soft skills, such as negotiation, conflict resolution, and adaptive reasoning, which are vital in interagency governance (Tilbury & Flowerday, 2024).

In the realm of trust, AI contributes to institutional transparency that emphasises explainability, auditability, and accountability in algorithmic processes (Behl et al., 2023). Trust is essential, particularly in the public sector context, where trust between collaborating parties depends on the ability to trace decision logic and validate outcomes. In addition, AI implementation has shown its ability to improve the IOC workflow by reducing human error, thereby improving the reliability of automated incident detection and task execution (Binbeshr et al., 2025). However, AI

applications are exposed to scepticism and trust issues due to misunderstandings of their decision-making algorithms (Behl et al., 2023). Moreover, the deployment of AI introduces cybersecurity risks, including unauthorized data access and cyberattacks, which can undermine trust in IOC workflows (Kshetri, 2025).

In the control regard, AI applications could strengthen oversight and governance by optimising resource allocation and real-time operational visibility (Peralta et al., 2025). These features are critical in the IOC workflow, particularly in e-payment settings where multiple organisations must align service delivery within contractual agreements. Thus, AI-driven monitoring systems can support continuous oversight by identifying anomalies and triggering automated responses, thereby enhancing organisational control and accountability (Ban et al., 2021; Islam, 2023). However, excessive automation may lead to automation bias, whereby human decision-makers defer to AI systems uncritically, potentially missing contextual or value-laden considerations (Mwangi et al., 2025). Furthermore, the integration of AI into existing control systems requires initial investments, such as financial and human resources, which pose barriers to implementation in resource-constrained environments (Cadei et al., 2022).

Finally, for information exchange, AI facilitates the robust processing and structuring of large-scale datasets, enabling faster decision-making and improved IOC communication (Ban et al., 2021; Malik & Rana, 2025). These capacities are essential for the public sector e-payment process, where accurate and timely information sharing is necessary to reconcile accounts, track transactions, and audit trails. AI tools also provide predictive insights and automated reporting features that enhance communication clarity among organisational actors (Cadei et al., 2022; Wang et al., 2023). Nonetheless, AI applications exposed to data quality issues, such as poorly curated, inconsistent, or biased information, can limit the effectiveness of AI analytics and undermine the credibility of shared outputs (Binbeshr et al., 2025). In addition, the dissemination of sensitive data raises serious privacy concerns (Behl et al., 2023).

In conclusion, AI presents a robust technological tool for enhancing IOC workflows in the public sector contexts. Its contributions across the IOC dimensions, such as collaboration, trust, control, and information exchange, are substantial but not without limitations. Addressing integration complexity, automation bias, data quality, and privacy risks is essential for realizing the full institutional value of AI. As such, public sector organisations must adopt not only technologically sophisticated but also ethically and organisationally sound implementation strategies to align AI systems with collaboration objectives.

T03- Strengthening IOC Workflows through Cloud Computing

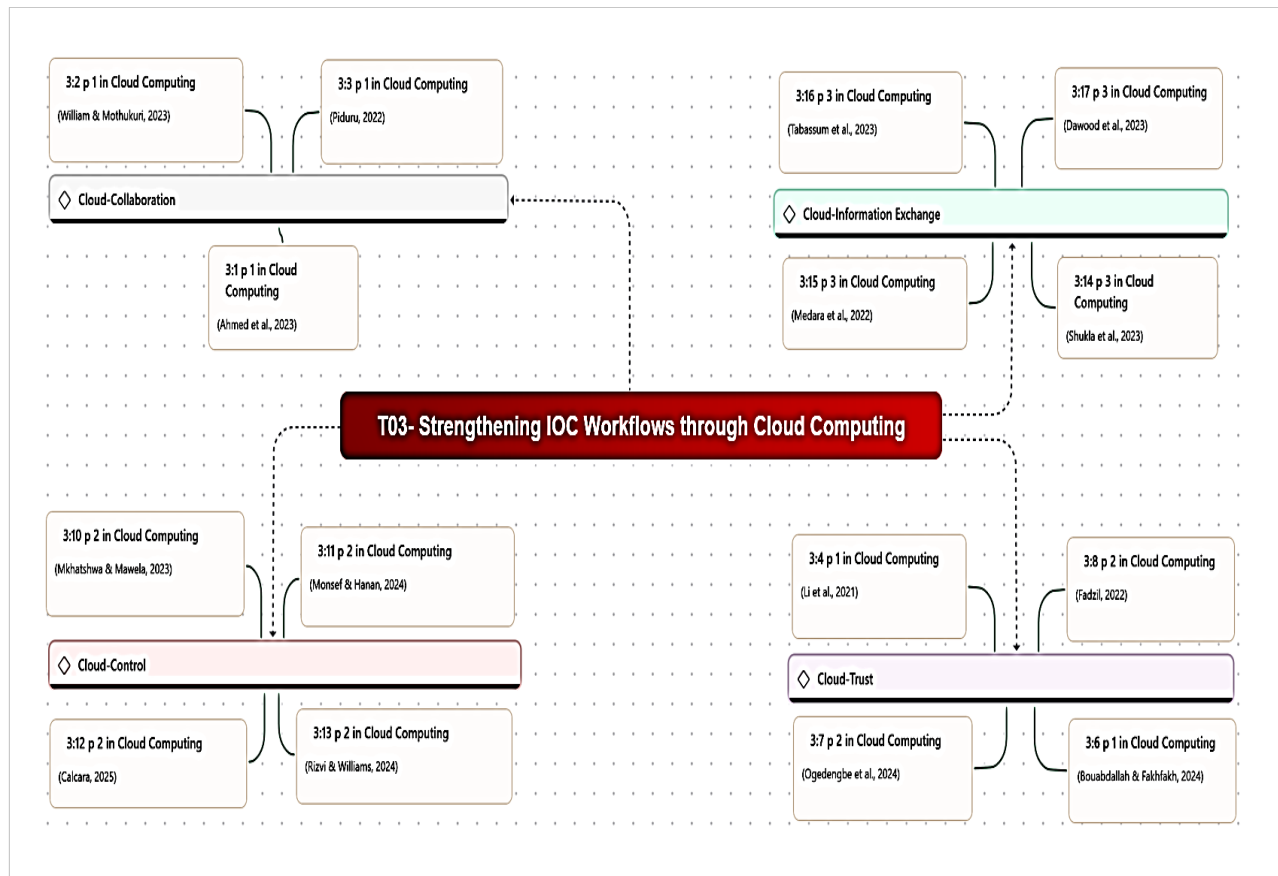
Figure 8 illustrates the theme that emerges from the analysis of cloud computing, which positions it as a key enabler in strengthening IOC workflows within digital ecosystems (Qazi et al., 2024). Its capacity to enhance collaboration, build trust, enforce control, and facilitate secure information exchange underscores its relevance in the modernisation of public sector e-payment systems.

From a collaboration perspective, cloud computing enables public agencies to co-create, share, and manage resources through common platforms (Ahmed et al., 2023). These platforms support real-time interactions such as joint document editing and shared processing environments, thereby

reducing fragmentation that often hinders coordination (Piduru, 2022). Furthermore, William and Mothukuri (2023) argue that cloud computing fosters interoperability between otherwise disparate systems, enabling agencies with different technological capacities to engage in synchronised service delivery. However, reliance on proprietary cloud solutions may result in vendor lock-in, creating long-term dependencies and reducing institutional flexibility (Akter, 2024). Moreover, variations in organisational readiness and governance structures limit the full realisation of cloud-enabled collaboration (Judijanto & Zulfikri, 2024).

Figure 8

T03- Strengthening IOC Workflows through Cloud Computing



Trust is a critical dimension of IOC, particularly in contexts involving sensitive financial data exchanges. Cloud computing enhances trust through robust security measures, including encryption, identity management, and ongoing auditing (Li et al., 2021). The implementation of Zero Trust Architecture further mitigates risks from insider threats by ensuring that all access requests are subject to verification (N'goran et al., 2022). These security mechanisms foster greater confidence and adoption in multi-agency collaborations (Ogedengbe et al., 2024). However, delegating data control to third-party vendors introduces significant risks, particularly concerning foreign jurisdiction and opaque data handling practices, which can erode institutional trust (Bouabdallah & Fakhfakh, 2024). High-profile incidents, such as the MySejahtera platform controversy in Malaysia, have heightened concerns over data leakage and potential reputational

harm (Fadzil, 2022). These issues underscore the vulnerability of institutional trust when data governance frameworks are perceived as inadequate.

In terms of control, cloud computing offers centralised dashboards, automated workflows, and integrated policy enforcement tools, which collectively enable real-time oversight and SLA compliance (Ajayi, 2025). Scheduling algorithms further optimise resource allocation, ensuring system efficiency for high-volume transactions (Golmohammadi et al., 2023). Nonetheless, over-centralisation risks undermining agency autonomy (Calcara, 2025). Automated controls, if rigid, may constrain the adaptability required in dynamic public sector environments (Monsef & Hanan, 2024). Furthermore, the opacity of control mechanisms in vendor systems reduces transparency and weakens institutional accountability (Rizvi & Williams, 2024). Hence, cloud-enabled control must balance automation with flexibility to preserve both accountability and responsiveness.

Finally, cloud computing significantly enhances information exchange by offering shared databases, APIs, and content delivery networks that enable low-latency access across agencies (Tsouplaki & Kalloniatis, 2024). This reduces redundancies and improves decision-making efficiency (Medara et al., 2022). However, the openness of cloud infrastructures raises concerns about sovereignty, confidentiality, and legal compliance, especially in contexts where data crosses national borders (Nadia Tabassum et al., 2023). Cyberattacks and internal misuse further expose vulnerabilities, with basic service packages often lacking adequate encryption and audit features (Dawood et al., 2023). Without robust data governance and regulatory frameworks, these risks could compromise the integrity of IOC workflows.

In conclusion, cloud computing holds considerable potential in strengthening IOC workflows within public sector e-payment systems by facilitating collaboration, embedding security-driven trust, and enabling real-time control and information exchange. Yet, its effectiveness depends on mitigating risks such as vendor dependency, over-centralisation, and weak data governance. For cloud computing to achieve its full promise, adaptive governance and regulatory safeguards must be developed to ensure both flexibility and institutional accountability across collaborative entities.

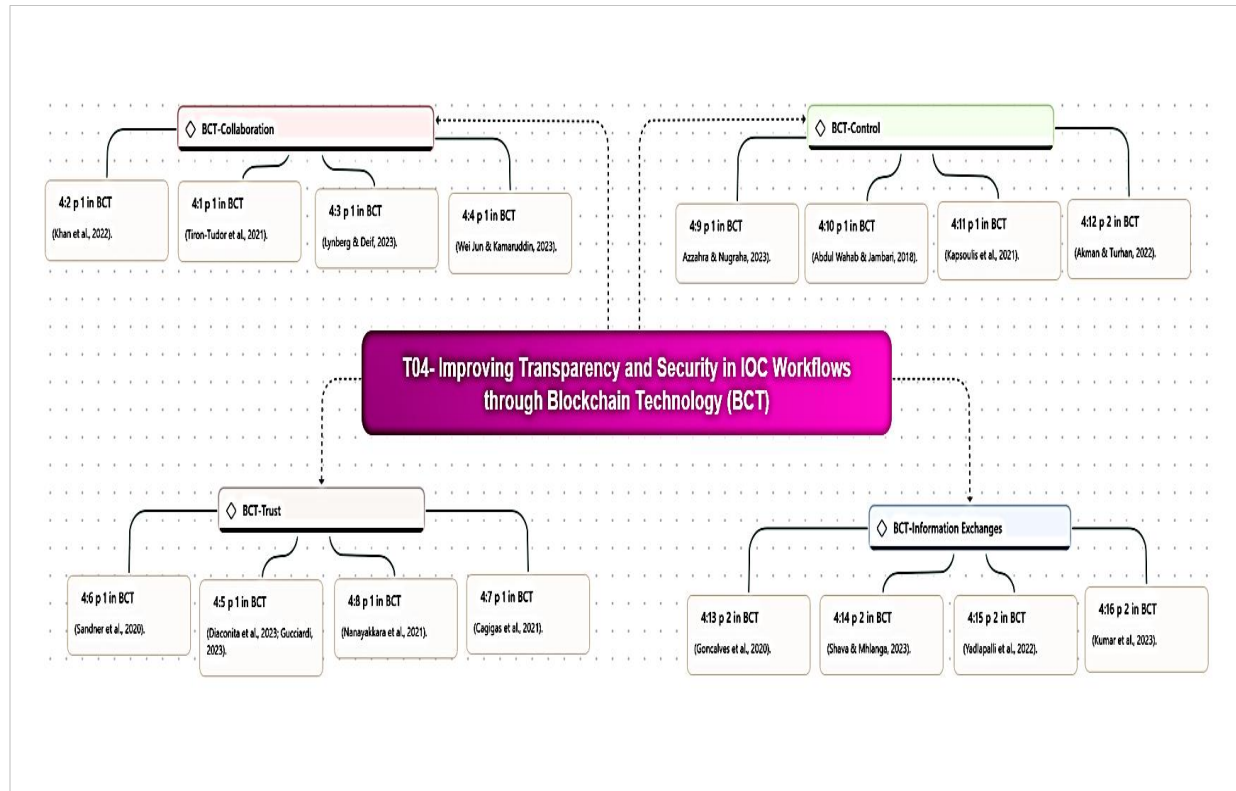
T04-Improving Transparency and Security in IOC Workflows through Blockchain Technology (BCT)

BCT has emerged as a technology enabler of IOC workflows in the public sector (see Figure 9). The unique characteristics of the BCT, such as decentralisation, transparency, immutability, and cryptographic security, offer potential to streamline processes across fragmented operations (Khairi et al., 2025). In terms of collaboration, BCT facilitates IOC by establishing a shared, tamper-resistant ledger that enables all authorised participants to record, validate, and access transaction data in real-time (Tiron-Tudor et al., 2021). This shared infrastructure eliminates traditional data silos and encourages effective coordination between public institutions, thereby promoting synchronised decision-making and accountability (Hijazi et al., 2023). For instance, BCT integrated with Internet of Things (IoT) technologies, has been employed to monitor public resources in real-time, enhancing transparency in resource allocation and improving service delivery (S. Khan et al., 2022). Nonetheless, collaboration through BCT may be impeded by differing technological maturity levels and interoperability issues across public agencies, especially when legacy systems are incompatible with distributed ledger technology (Lynberg &

Deif, 2023). Moreover, the cultural resistance to cross-agency data sharing remains a barrier in many bureaucratic settings (Wei Jun & Kamaruddin, 2023).

Figure 9

T04-Improving Transparency and Security in IOC Workflows through BCT



In the trust dimension, BCT reinforces trust elements through its transparent and immutable transaction history, which allows all nodes to independently verify records without requiring oversight from a central authority (Diaconita et al., 2023; Gucciardi, 2023). Verifiability is significant in reducing the risk of data manipulation or fraud and fosters trust in a digital environment where long-term IOC can be developed (Sandner et al., 2020). However, establishing trust in BCT-based systems also demands confidence in the underlying technical infrastructure and cryptographic protocols, which may be difficult for non-technical public officials to fully comprehend, thereby introducing a new form of institutional trust deficit (Cagigas et al., 2021). Furthermore, while BCT ensures data integrity, it does not guarantee data accuracy at the point of input, highlighting the persistent role of human oversight (Nanayakkara et al., 2021).

Regarding the control mechanism, BCT can enhance this element by enabling granular access permissions and enforcing business rules through programmable applications, such as smart contracts (Azzahra & Nugraha, 2023). Smart contracts can automate routine tasks, such as eligibility checks on reconciliation, budgeting thresholds, and regulatory audits, thereby eliminating manual processes and reducing human error (Abdul Wahab & Jambari, 2018). Nevertheless, the decentralised nature of BCT can paradoxically reduce institutional control over the system's evolution, as changes require consensus among all nodes (Kapsoulis et al., 2021).

Moreover, updating new rules on smart contracts is a complex process that potentially limits the flexibility of public administrators in responding to evolving legal or policy requirements (Akman & Turhan, 2022).

Finally, in information exchange, the BCT could ensure that all data entered the network is validated and agreed upon by authorised members before becoming immutable, which enhances data integrity and trustworthiness in the IOC workflows (Goncalves et al., 2020). This facilitates timely and reliable communication between public organisations, potentially reducing bureaucratic delays and increasing responsiveness to inter-agency communication (Shava & Mhlanga, 2023). However, the technical complexity of BCT networks can create steep learning curves for public sector employees, often requiring substantial investment in capacity building and digital literacy programs (Yadlapalli et al., 2022). Additionally, privacy concerns may arise when sensitive personal or institutional data are broadcast across a distributed ledger, despite the use of encryption and pseudonymisation techniques (Kumar et al., 2023)

In conclusion, BCT presents compelling opportunities to enhance the collaborative capacity, transparency, and operational efficiency of IOC workflows in the public sector. Its ability to transform the dimensions of collaboration, trust, control, and information exchange is evident. Yet, its successful adoption is contingent upon addressing inherent limitations such as technological complexity, regulatory inertia, and institutional readiness.

DISCUSSION

In the context of improving IOC workflows within the public sector's e-payment systems, the integration of emerging digital technologies offers significant potential. Longstanding inefficiencies, such as fragmented operations, manual processes, inconsistencies in service-level agreement (SLA) enforcement, and communication barriers, continue to impede the effectiveness and integrity of settlement processes (Őri et al., 2024). Against this backdrop, technologies including AI, RPA, Cloud Computing, and BCT present distinct opportunities when analysed through the four dimensions of the IOC framework: collaboration, trust, control, and information exchange. The findings of this review reinforce earlier observations by Khairi and Saadan (2025), who noted that challenges in Malaysia's IOC workflow in the e-payment operations stem from operational silos. The thematic synthesis here extends their argument by demonstrating that while automation and data-driven tools may enhance efficiency, their effectiveness depends on the alignment of technology design with existing bureaucratic structures and accountability frameworks within the Malaysian administrative apparatus.

From a collaboration perspective, each technology supports operational integration and collective decision-making to different extents. RPA strengthens collaborative workflows by automating repetitive inter-agency tasks, reducing clerical burdens, and accelerating reconciliation and validation processes (Götzen et al., 2022; Moron & Diokno, 2023). AI enhances collaboration by providing predictive analytics and scenario modelling that improve data-driven decisions across agencies (Alomar & Jacob, 2025). Cloud computing, meanwhile, fosters collaboration by enabling agencies to access shared platforms, documents, and processing environments in real-time, reducing reliance on siloed systems (Piduru, 2022; William & Mothukuri, 2023). Nevertheless, limitations persist: RPA faces resistance from staff concerned about job redundancy, AI is

challenged by technical complexity, and cloud computing is constrained by vendor lock-in and sovereignty concerns. By contrast, BCT introduces a decentralised, tamper-proof ledger accessible to all authorised stakeholders. Its shared, real-time record of transactions eliminates role ambiguity and synchronises IOC workflows without relying on a central authority (Hijazi et al., 2023; Tiron-Tudor et al., 2021). Although interoperability remains a hurdle, BCT's consensus-based mechanisms offer a more durable foundation for collaboration than conventional digital solutions (Lynberg & Deif, 2023). The findings indicate that in the Malaysian public sector, collaboration barriers are not solely technological but socio-administrative. Centralised decision hierarchies, overlapping mandates, and procedural rigidity often limit cross-agency data flow. Therefore, technological adoption must be accompanied by policy and top management support to promote interoperable and participatory governance. In this respect, BCT's shared ledger approach resonates strongly with Malaysia's public accountability agenda, as outlined in the National Digital Economy Blueprint and the Public Financial Management Reform initiatives (Alafnan & Mohdzuki, 2024).

Trust is another pivotal dimension of IOC, with each technology cultivating it in different ways. AI advances trust through Responsible AI (RAI) principles such as transparency and auditability (Behl et al., 2023). However, public scepticism remains, particularly regarding the opacity of algorithms and heightened cybersecurity risks (Kshetri, 2025). RPA builds trust by ensuring consistency and reliability in executing standardised tasks, though fears of displacement and weak governance structures undermine acceptance (Story et al., 2022; Syed & Wynn, 2020). Cloud computing promotes trust via encryption, identity management, and real-time monitoring (Li & Kassem, 2021; N'goran et al., 2022), yet issues of vendor opacity and data sovereignty—exemplified by the MySejahtera controversy in Malaysia—raise doubts about accountability (Fadzil, 2022). In contrast, BCT strengthens trust through its cryptographic and verifiable nature, reducing dependence on any single institution. This decentralised integrity minimises manipulation risks and fosters inter-agency confidence (Diaconita et al., 2023; Sandner et al., 2020). Although technical literacy remains a prerequisite, BCT addresses the structural roots of mistrust more comprehensively than the other technologies. From the Malaysian context, the findings suggest that rebuilding IOC workflow trust extends beyond system transparency to include institutional credibility and regulatory enforcement. As evidenced by issues such as delayed remittance reporting highlighted by the Auditor General (2022), digital systems alone cannot compensate for inconsistent compliance practices. This study therefore asserts that technological trust mechanisms, such as BCT's verifiable audit trails and AI's algorithmic accountability, must operate in tandem with governance reforms to rebuild public confidence in e-payment workflows.

Control, particularly in relation to SLA enforcement, is also addressed differently by each technology. RPA provides strict procedural control by codifying workflows, ensuring standardisation and traceability (Kurowski et al., 2024). AI enhances oversight through anomaly detection and real-time monitoring (Peralta et al., 2025). Cloud computing centralises control mechanisms with dashboards, policy engines, and scheduling tools, enabling efficient governance (Ajayi, 2025). Nonetheless, these are limited by over-centralisation (cloud), automation bias (AI), or rigid adaptability (RPA). Blockchain, by embedding governance into smart contracts, offers automated compliance, auditability, and SLA enforcement (Azzahra & Nugraha, 2023; Abdul Wahab & Jambari, 2018). These contracts provide transparent, tamper-resistant mechanisms,

reducing both intentional and unintentional breaches (Saari et al., 2025). While updating smart contracts requires technical expertise and consensus, decentralised accountability makes BCT more resilient in ensuring collaborative compliance. The findings also highlight that in Malaysia's highly regulated environment, achieving balanced control is essential to avoid over-centralisation. Excessive reliance on top-down digital monitoring tools can stifle agility and innovation within agencies. Thus, decentralised yet accountable control systems such as BCT-enabled smart contracts offer a more balanced model for ensuring SLA enforcement and inter-agency accountability without compromising institutional autonomy.

Information exchange, the final dimension, is facilitated differently across the four technologies. AI supports rapid data analysis and automated reporting, enabling more actionable insights (Malik & Rana, 2025). RPA provides rule-based data transfer across legacy systems but struggles with unstructured or low-interoperability environments (Tomar & Grover, 2024). Cloud computing enhances responsiveness by granting low-latency access to shared resources, documents, and data across institutions (Tsouplaki & Kalloniatis, 2024; Medara et al., 2022). Yet, its openness increases risks of data breaches, confidentiality issues, and jurisdictional disputes (Tabassum et al., 2023). Blockchain surpasses these limitations by validating all exchanges via consensus, generating an immutable and auditable trail (Goncalves et al., 2020; Shava & Mhlanga, 2023). Despite high implementation costs and governance requirements, BCT eliminates information asymmetry and ensures all parties share a "single source of truth," thus reinforcing transparency and accuracy in IOC workflows. The findings further reveal that information asymmetry among Malaysian government agencies persists despite digitalisation. For instance, separate reporting protocols between acquiring banks and accounting offices create reconciliation delays. This study contends that the adoption of BCT or hybrid AI–cloud solutions could establish a unified data-sharing infrastructure, ensuring real-time visibility across financial reporting entities. Such integration would directly address the operational inefficiencies documented by Khairi and Saadan (2025), aligning with Malaysia's aspirations for data-driven governance.

Taken together, AI, RPA, and Cloud Computing make meaningful contributions to modernising e-payment systems but are often piecemeal, infrastructure-dependent, and constrained by socio-technical barriers (see Table 5). BCT, by contrast, reconfigures collaboration, embeds trust within its architecture, decentralises yet enhances control, and ensures secure, tamper-resistant information exchange. By aligning with collaborative governance principles such as transparency, accountability, and decentralisation, BCT emerges as the most structurally resilient and contextually appropriate digital infrastructure for strengthening IOC within public sector e-payment ecosystems.

Table 5

Summary of Technology Suitability in Improving IOC Workflows

No	Technology	Collaboration	Trust	Control	Information Exchange	Suitability Summary
1	Robotic Process Automation (RPA)	Moderate	Moderate	High	Moderate	Best for routine task automation, limited flexibility
2	Artificial Intelligence (AI)	High	Moderate	High	High	Strong predictive & decision support, complex to govern
3	Cloud Computing	High	Moderate	Moderate	High	Real-time access & sharing, prone to centralisation
4	Blockchain Technology (BCT)	Very High	Very High	Very High	Very High	Decentralised, secure, transparent, and most resilient

CONCLUSION

This study critically examined the role of AI, RPA, Cloud Computing, and BCT in strengthening IOC workflows within Malaysia's public sector e-payment ecosystem. By employing the IOC framework as an analytical lens, the discussion demonstrated how each technology interacts with the key dimensions of collaboration, trust, control, and information exchange that underpin effective multi-agency financial operations. Within Malaysia's e-payment process, these dimensions are especially pertinent to post-collection activities such as reconciliation, settlement, and accounting record integration, functions that require coordinated action between government agencies, acquiring banks, and accounting offices. AI facilitates predictive decision-making and operational analytics that enhance coordination and accuracy in fund reconciliation. RPA contributes by automating repetitive administrative processes, reducing manual workload, and expediting data validation across inter-agency workflows.

However, both technologies face barriers related to system integration complexity, socio-technical resistance, and limited adaptability within bureaucratic hierarchies typical of public sector institutions. Cloud Computing, on the other hand, offers infrastructural interoperability and shared resource environments that support cross-agency data exchange, yet it also introduces challenges concerning vendor dependency, data sovereignty, and institutional autonomy. Among the technologies assessed, BCT emerges as the most comprehensive and contextually aligned enabler of resilient IOC workflows within Malaysia's public e-payment system. Its decentralised, tamper-proof, and transparent architecture directly addresses long-standing issues such as fragmented operations, manual reconciliation, inconsistent service-level agreement (SLA) enforcement, and delayed communication between agencies. By establishing a shared, immutable ledger accessible to all authorised stakeholders, BCT enhances real-time visibility, accountability, and data integrity across the e-payment value chain. The study's main contribution lies in providing a comparative, dimension-based evaluation of emerging technologies within the highly regulated and multi-tiered environment of Malaysia's public financial administration. Conceptually, it extends the

understanding of how digital technologies can operationalise IOC principles such as collaboration, trust, control, and information exchange within inter-agency payment ecosystems.

Practically, it offers policy-relevant insights for decision-makers and system architects seeking to modernise public financial management through accountable and interoperable digital infrastructures. Nevertheless, several limitations remain. The study did not incorporate cost-benefit assessments, stakeholder readiness analyses, or political-institutional dynamics that may influence technology adoption and scalability. These gaps caution against generalising BCT as a universal solution across all government settings. Future research should therefore employ longitudinal case studies and pilot implementations to examine real-world outcomes of BCT integration in Malaysia's e-payment operations, particularly its effects on SLA compliance, reconciliation efficiency, and cross-agency transparency. Furthermore, hybrid technological ecosystems that combine BCT with AI and Cloud Computing could be explored to optimise operational resilience, enhance real-time decision-making, and strengthen institutional adaptability in the evolving landscape of Malaysia's digital public finance system.

ACKNOWLEDGEMENT

Gratefully acknowledge the Public Service Department of Malaysia (JPA) for granting study leave and financial support under the Hadiah Latihan Persekutuan (HLP). Sincere appreciation to Universiti Sains Islam Malaysia (USIM) particularly the Faculty of Economics and Muamalat for their academic support and research facilitation throughout the course of this study.

REFERENCES

- Abdul Wahab, M., & Jambari, D. I. (2018). Parameter Penakrifan Perjanjian Tahap Perkhidmatan bagi Penggubalan Draf Kontrak Sistem Maklumat Sektor Awam. *Jurnal Pengurusan*, 52, 153–167. <https://doi.org/10.17576/pengurusan-2018-52-13>
- Accountant General Department. (2024). *E-payment Collection Report for Federal Government Agencies of Malaysia in 2024*.
- Adomako, S., & Nguyen, N. P. (2023). Digitalization, inter-organizational collaboration, and technology transfer. *Journal of Technology Transfer*, 49(4), 1176–1202. <https://doi.org/10.1007/s10961-023-10031-z>
- Agostinelli, S., Marrella, A., & Mecella, M. (2019). Research Challenges for Intelligent Robotic Process Automation. In C. Di Francescomarino, R. Dijkman, & U. Zdun (Eds.), *Business Process Management Workshops* (pp. 12–18). Springer International Publishing.
- Ahmed, H., Youssef, H., Tamer, A., & Hossam, A. (2023). Privacy Issues in AI and Cloud Computing in E-commerce Setting: A Review. *International Journal of Responsible Artificial Intelligence* 37–46.
- Ahmi, A., Husni Hamzah, A., Tapa, A., & Husni Hamzah, A. (2020). Mapping of Financial Technology (FinTech) Research: A Bibliometric Analysis Article in International Journal of Advanced Science and Technology. *International Journal of Advanced Science and Technology*, 29(8), 379–392. <https://www.researchgate.net/publication/351103949>
- Ajayi, R. (2025). Integrating IoT and cloud computing for continuous process optimization in real time systems. *International Journal of Research Publication and Reviews*, 6(1), 2540–2558. <https://doi.org/10.55248/gengpi.6.0125.0441>

- Akman, I., & Turhan, C. (2022). Sector Diversity among IT Professionals in the Timing of Blockchain Adoption: an Attitudinal Perspective. *Engineering Economics*, 33(5), 461–472. <https://doi.org/10.5755/j01.ee.33.5.28872>
- Akter, S. (2024). Harmonizing Compliance: Coordinating Automated Verification Processes within Cloud-based AI/ML Workflows. *Journal of Artificial Intelligence General Science (JAIGS) ISSN:3006-4023*, 3(1), 292–302. <https://doi.org/10.60087/jaigs.v3i1.121>
- Alafnan, M. A., & Mohdzuki, S. F. (2024). Malaysia “s National Blockchain Roadmap : A Critical Discourse Analysis of Focus , Goals , and Challenges. *World Journal of English Language*, 14(5), 482–492. <https://doi.org/10.5430/wjel.v14n5p482>
- Alomar, I., & Jacob, C. O. (2025). The Integration of Artificial Intelligence in Management of Airline Operation Control Centre (SmartLynx Airlines Case Study) (pp. 398–409). *Springer Nature*. https://doi.org/10.1007/978-3-031-85390-6_37
- Angst, M., & Brandenberger, L. (2021). *Information Exchange in Governance Networks—Who Brokers Across Political Divides? Governance*. <https://doi.org/10.1111/gove.12601>
- Ansell, C., & Torfing, J. (2022). *Handbook On Theories Of Governance: Second Edition. In Handbook on Theories of Governance*. <https://doi.org/10.4337/9781800371972>
- Anthony Anyanwu, Samuel Onimisi Dawodu, Adedolapo Omotosho, Odunayo Josephine Akindote, & Sarah Kuzankah Ewuga. (2023). Review of blockchain technology in government systems: Applications and impacts in the USA. *World Journal of Advanced Research and Reviews*, 20(3), 863–875. <https://doi.org/10.30574/wjarr.2023.20.3.2553>
- Azzahra, Z. F., & Nugraha, I. G. B. B. (2023). Service-Level Agreement Management with Blockchain-based Smart Contract to Improve the Quality of IT Service Management. *ACM International Conference Proceeding Series*, 260–266. <https://doi.org/10.1145/3587828.3587867>
- Azzam, F., Jaber, M., Saies, A., Kirresh, T., Awadallah, R., Karakra, A., Barghouthi, H., & Amarneh, S. (2023). The Use of Blockchain Technology and OCR in E-Government for Document Management: Inbound Invoice Management as an Example. *Applied Sciences (Switzerland)*, 13(14). <https://doi.org/10.3390/app13148463>
- Babšek, M., Ravšelj, D., Umek, L., & Aristovnik, A. (2025). Artificial Intelligence Adoption in Public Administration: An Overview of Top-Cited Articles and Practical Applications. *AI (Switzerland)*, 6(3). <https://doi.org/10.3390/ai6030044>
- Baiod, W., & Hussain, M. M. (2024). The impact and adoption of emerging technologies on accounting: perceptions of Canadian companies. *International Journal of Accounting & Information Management*, 32(4), 557–592. <https://doi.org/10.1108/IJAIM-05-2023-0123>
- Ban, T., Samuel, N., Takahashi, T., & Inoue, D. (2021). Combat Security Alert Fatigue with AI-Assisted Techniques. *Cyber Security Experimentation and Test Workshop*, 9–16. <https://doi.org/10.1145/3474718.3474723>
- Bédard, M., Leshob, A., Benzarti, I., Mili, H., Rab, R., & Hussain, O. (2024). A rule-based method to effectively adopt robotic process automation. *Journal of Software: Evolution and Process*, 36(11), 1–22. <https://doi.org/10.1002/smr.2709>
- Behl, A., Sampat, B., Pereira, V., & Chiappetta Jabbour, C. J. (2023). The role played by responsible artificial intelligence (RAI) in improving supply chain performance in the MSME sector: an empirical inquiry. *Annals of Operations Research*. <https://doi.org/10.1007/s10479-023-05624-8>
- Bhurgri, S. S., Ali, N. I., Korejo, I. A., & Brohi, I. A. (2024). Enhancing Security and Confidentiality in Decentralized Payment System Based on Blockchain Technology. *The*

- Asian Bulletin of Big Data Management*, 4(1). <https://doi.org/10.62019/abbdm.v4i1.119>
- Binbeshr, F., Imam, M., Ghaleb, M., Hamdan, M., Rahim, M. A., & Hammoudeh, M. (2025). The Rise of Cognitive SOCs: A Systematic Literature Review on AI Approaches. *IEEE Open Journal of the Computer Society*, 6, 360–379. <https://doi.org/10.1109/OJCS.2025.3536800>
- Bouabdallah, R., & Fakhfakh, F. (2024). Workflow Scheduling in Cloud–Fog Computing Environments: A Systematic Literature Review. *Concurrency and Computation: Practice and Experience*, 36(28). <https://doi.org/10.1002/cpe.8304>
- Braun, T., & Möller, R. (2024). AI in Healthcare and the Public Sector: How to Face the Challenges of High-Risk Applications and What AI Research Can Get Out of It. *KI - Kunstliche Intelligenz*, 38(3), 119 – 126. <https://doi.org/10.1007/s13218-024-00853-w>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Bustamante, P., Cai, M., Gomez, M., Harris, C., Krishnamurthy, P., Law, W., Madison, M. J., Murtazashvili, I., Murtazashvili, J. B., Mylovanov, T., Shapoval, N., Vee, A., & Weiss, M. (2025). Government by Code? Blockchain Applications to Public Sector Governance. *Frontiers in Blockchain*, 5. <https://doi.org/10.3389/fbloc.2022.869665>
- Cadei, L., Rossi, G., Lancia, L., Loffreno, D., Corneo, A., Milana, D., Montini, M., Purlalli, E., Fier, P., Carducci, F., & Nizzolo, R. (2022, March 21). Digital Lighthouse: A Scalable Model for Digital Transformation in Oil & Gas. *SPE Conference at Oman Petroleum & Energy Show*. <https://doi.org/10.2118/200149-MS>
- Cafruni Gulate, A., Carísio de Paula, I., Siqueira de Souza, J., & Flores Sum, F. (2024). Economic-financial analysis procedure: Implementation of inter-organizational circular systems. *Journal of Cleaner Production*, 452, 142242. <https://doi.org/10.1016/j.jclepro.2024.142242>
- Cagigas, D., Clifton, J., Diaz-Fuentes, D., & Fernandez-Gutierrez, M. (2021). Blockchain for Public Services: A Systematic Literature Review. *IEEE Access*, 9, 13904–13921. <https://doi.org/10.1109/ACCESS.2021.3052019>
- Caglio, A., & Ditillo, A. (2012). Opening the black box of management accounting information exchanges in buyer–supplier relationships. *Management Accounting Research*, 23(2), 61–78. <https://doi.org/10.1016/j.mar.2012.03.001>
- Calcara, A. (2025). European cloud computing policy: failing in Europe to succeed nationally? *West European Politics*, 0(0), 1–25. <https://doi.org/10.1080/01402382.2025.2491962>
- Central Bank of Malaysia. (2025). *BNM Payment Statistics (T2 Report)*. <https://www.bnm.gov.my/payment-statistics>
- Clifton, J., Fernández-Gutiérrez, M., & Cagigas, D. (2023). Beyond the hype—the actual use of blockchain in government. *Policy Design and Practice*, 6(4), 389 – 396. <https://doi.org/10.1080/25741292.2023.2272377>
- Dawood, M., Tu, S., Xiao, C., Alasmay, H., Waqas, M., & Rehman, S. U. (2023). *Cyberattacks and Security of Cloud Computing: A Complete Guideline*. *Symmetry*, 15(11), 1–33. <https://doi.org/10.3390/sym15111981>
- Dekker, H. C. (2004). Control of inter-organizational relationships: evidence on appropriation concerns and coordination requirements. *Accounting, Organizations and Society*, 29(1), 27–49. [https://doi.org/10.1016/S0361-3682\(02\)00056-9](https://doi.org/10.1016/S0361-3682(02)00056-9)
- Diaconita, V., Belciu, A., & Stoica, M. G. (2023). Trustful Blockchain-Based Framework for Privacy Enabling Voting in a University. *Journal of Theoretical and Applied Electronic Commerce Research*, 18(1), 150–169. <https://doi.org/10.3390/jtaer18010008>
- Dowelani, M., Okoro, C., & Olaleye, A. (2023). Blockchain technology in the clearing and

- settlement industry in South Africa. *Acta Commercii - Independent Research Journal in the Management Sciences*, 23(1), 1–12. <https://doi.org/10.4102/ac.v23i1.109>
- Dyer, J. H., & Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *The Academy of Management Review*, 23(4), 660. <https://doi.org/10.2307/259056>
- Fadzil, F. (2022, June). Data Peribadi Rakyat Malaysia Termasuk MySejahtera Didakwa Dijual Di Internet. *The Rakyat Post*. <https://www.therakyatpost.com/trpbm/tek/2022/06/13/data-peribadi-rakyat-malaysia-termasuk-mysejahtera-didakwa-dijual-di-internet/>
- Fintech Malaysia. (2024). Fintech Report. <https://fintechnews.my/wp-content/uploads/2024/11/Malaysia-Fintech-Report-2024.pdf#page=9.40>
- Flechsig, C., Anslinger, F., & Lasch, R. (2022). Robotic Process Automation in purchasing and supply management: A multiple case study on potentials, barriers, and implementation. *Journal of Purchasing and Supply Management*, 28(1), 100718. <https://doi.org/10.1016/j.pursup.2021.100718>
- Fong, D., Han, F., Liu, L., Qu, J., & Shek, A. (2021). Seven technologies shaping the future of fintech. In *McKinsey analysis November* (pp. 1–13). McKinsey & Company. https://www.mckinsey.com/cn/~media/mckinsey/locations/asia/greater_china/our_insights/seven_technologies_shaping_the_future_of_fintech/seven-fintech-trends.pdf
- Ganeshu, P., Fernando, T., Therrien, M.-C., & Keraminiyage, K. (2024). Inter-Organisational Collaboration Structures and Features to Facilitate Stakeholder Collaboration. *Administrative Sciences*, 14(2), 25. <https://doi.org/10.3390/admsci14020025>
- Golmohammadi, A., Kamel Tabbakh, S. R., & Ghaemi, R. (2023). A review on workflow scheduling and resource allocation algorithms in distributed mobile clouds. *Transactions on Emerging Telecommunications Technologies*, 34(8). <https://doi.org/10.1002/ett.4811>
- Gomaa, A. A., Gomaa, M. I., Boumediene, S. L., & Farag, M. S. (2023). The Creation of One Truth: Single-Ledger Entries for Multiple Stakeholders Using Blockchain Technology to Address the Reconciliation Problem. *Journal of Emerging Technologies in Accounting*, 20(1), 59–75. <https://doi.org/10.2308/JETA-19-06-01-28>
- Goncalves, J. . D. B., Gomes, R., Da Silva Villaca, R., Municio, E., & Marquez-Barja, J. (2020). A Quality of Service Compliance System Empowered by Smart Contracts and Oracles. *Proceedings - 2020 IEEE International Conference on Blockchain, Blockchain 2020*, 532–538. <https://doi.org/10.1109/Blockchain50366.2020.00077>
- Götzen, R., von Stamm, J., Conrad, R., & Stich, V. (2022). *Understanding the Organizational Impact of Robotic Process Automation: A Socio-Technical Perspective* (pp. 106–114). https://doi.org/10.1007/978-3-031-14844-6_9
- Gucciardi, A. (2023). *Trustless contract management : a study on the benefits of blockchain-based smart contracts*. Politecnico di Torino.
- Haq, S. H. U., Dan, S., & Shahzad, K. (2025). Leadership competencies and blockchain implementation in public sector organizations: a sensemaking approach. *International Journal of Public Sector Management*, 38(1), 139 – 158. <https://doi.org/10.1108/IJPSM-12-2023-0347>
- Hijazi, A. A., Perera, S., Calheiros, R. N., & Alashwal, A. (2023). A data model for integrating BIM and blockchain to enable a single source of truth for the construction supply chain data delivery. *Engineering, Construction and Architectural Management*, 30(10), 4645–4664. <https://doi.org/10.1108/ECAM-03-2022-0209>
- Hopko, S. K., Khurana, R., Mehta, R. K., & Pagilla, P. R. (2021). Effect of Cognitive Fatigue,

- Operator Sex, and Robot Assistance on Task Performance Metrics, Workload, and Situation Awareness in Human-Robot Collaboration. *IEEE Robotics and Automation Letters*, 6(2), 3049–3056. <https://doi.org/10.1109/LRA.2021.3062787>
- Hummell, E., Venning, A., Foster, M., Fisher, K. R., & Kuipers, P. (2022). A rapid review of barriers and enablers of organisational collaboration: Identifying challenges in disability reform in Australia. *Australian Journal of Social Issues*, 57(2), 441–457. <https://doi.org/10.1002/ajs4.188>
- Ilin, V., Ivetić, J., & Simić, D. (2017). Understanding the determinants of e-business adoption in ERP-enabled firms and non-ERP-enabled firms: A case study of the Western Balkan Peninsula. *Technological Forecasting and Social Change*, 125(August), 206–223. <https://doi.org/10.1016/j.techfore.2017.07.025>
- Islam, M. A. (2023). Application of Artificial Intelligence and Machine Learning in A Security Operations Center. *Issues In Information Systems*, 24(4). https://doi.org/10.48009/4_iis_2023_124
- Jabatan Audit Negara Malaysia. (2022). Laporan Ketua Audit Negara 2021 Siri 1 - *Aktiviti Kementerian/Jabatan Kerajaan Persekutuan Dan Badan-Badan Berkanun Persekutuan*. In Percetakan Nasional Malaysia Berhad. <https://www.audit.gov.my>
- Judijanto, L., & Zulfikri, A. (2024). Advancing Supply Chain Resilience Through Cloud-Based Logistics: A Narrative Review. *Sinergi International Journal of Logistics*, 2(3), 147–159. <https://doi.org/10.61194/sijl.v2i3.625>
- Kapsoulis, N., Psychas, A., Litke, A., & Varvarigou, T. (2021). Reinforcing SLA consensus on blockchain. *Computers*, 10(12), 1–12. <https://doi.org/10.3390/computers10120159>
- Kedziora, D., Modliński, A., Smolander, K., Piotrowicz, W., & Syed, R. (2024). Collaborative implementation framework for building trust in software robots. In *Trust and Artificial Intelligence* (pp. 284–294). Routledge. <https://doi.org/10.4324/9781032627236-25>
- Khairi, K. F., & Saadan, N. (2025). Inter-organisational Collaboration Workflow Challenges and the Potential of Technology Integration for E-Payment Process Improvement: A Case Study of a Malaysian Public Sector Agency. *Journal of Accounting and Governance*, 24(2).
- Khairi, K. F., Saadan, N., & Abdullah Mohammed Ahmed Ayedh. (2025). Exploring Blockchain Technology Suitability in Inter- Organisational Workflows: A Thematic Review of E-Payment Process in the Malaysian Public Sector. *The Journal of Muamalat and Islamic Finance Research*, 22(1), 39–67. <https://doi.org/10.33102/jmifr.647>
- Khalfan, M., Azizi, N., Haass, O., Maqsood, T., & Ahmed, I. (2022). Blockchain Technology: Potential Applications for Public Sector E-Procurement and Project Management. *Sustainability (Switzerland)*, 14(10). <https://doi.org/10.3390/su14105791>
- Kostić, N., & Sedej, T. (2022). Blockchain Technology, Inter-Organizational Relationships, and Management Accounting: A Synthesis and a Research Agenda. *Accounting Horizons*, 36(2), 123–141. <https://doi.org/10.2308/HORIZONS-19-147>
- Kshetri, N. (2025). Redefining Human Resource Practices With AI Agents and Agentic AI: Automated Compliance and Enhanced Productivity. *Computer*, 58(6), 119–124. <https://doi.org/10.1109/MC.2025.3559245>
- Kumar, D., Singh, R. K., Mishra, R., & Daim, T. U. (2023). Roadmap for integrating blockchain with Internet of Things (IoT) for sustainable and secured operations in logistics and supply chains: Decision making framework with case illustration. *Technological Forecasting and Social Change*, 196(January), 122837. <https://doi.org/10.1016/j.techfore.2023.122837>
- Kurowski, K., Martínez-Rojas, A., & Reijers, H. A. (2024). I (pp. 56–64).

- https://doi.org/10.1007/978-3-031-59468-7_7
- Larikova, T., Ivankov, V., & Novichenko, L. (2023). Implementation of Blockchain Technology in The System of Accounting and Analytical Support For The Public Sector. *Eastern-European Journal of Enterprise Technologies*, 5(13(125)), 77 – 87. <https://doi.org/10.15587/1729-4061.2023.290024>
- Li, T., Wandella, A., Gomer, R., & Al-Mafazy, M. H. (2024). Operationalizing health data governance for AI innovation in low-resource government health systems: a practical implementation perspective from Zanzibar. *Data and Policy*, 6. <https://doi.org/10.1017/dap.2024.65>
- Li, W., Wu, J., Cao, J., Chen, N., Zhang, Q., & Buyya, R. (2021). Blockchain-based trust management in cloud computing systems: a taxonomy, review and future directions. *Journal of Cloud Computing*, 10(1), 35. <https://doi.org/10.1186/s13677-021-00247-5>
- Lumineau, F., Wang, W., & Schilke, O. (2021). *Blockchain Governance—A New Way of Organizing Collaborations?* *Organization Science*. <https://doi.org/10.1287/orsc.2020.1379>
- Luthra, S., Janssen, M., Rana, N. P., Yadav, G., & Dwivedi, Y. K. (2023). Categorizing and relating implementation challenges for realizing blockchain applications in government. *Information Technology and People*, 36(4), 1580 – 1602. <https://doi.org/10.1108/ITP-08-2020-0600>
- Lynberg, L., & Deif, A. (2023). Network effects in blockchain and supply chain: a theoretical research synthesis. *Modern Supply Chain Research and Applications*, 5(1), 2–27. <https://doi.org/10.1108/MS CRA-07-2022-0016>
- Mahusin, N., Sallehudin, H., & Satar, N. S. M. (2024). Malaysia Public Sector Challenges of Implementation of Artificial Intelligence (AI). *IEEE Access*, 12, 121035 – 121051. <https://doi.org/10.1109/ACCESS.2024.3448311>
- Malik, S., & Rana, A. (2025). The Impact of Artificial Intelligence on Organizational Efficiency and Innovation. *Journal of Graphic Era University*, 183–204. <https://doi.org/10.13052/jgeu0975-1416.1319>
- Mamede, H. S., Gonçalves Martins, C. M., & Mira da Silva, M. (2023). A lean approach to robotic process automation in banking. *Heliyon*, 9(7), e18041. <https://doi.org/10.1016/j.heliyon.2023.e18041>
- Martínez, M. A. D., Salinas, R. V. R., Hernández, S. R., Ruíz Domínguez, H. S., Zubirías, G. C., & Morales Rodríguez, M. A. (2024). Artificial intelligence an essential factor for the benefit of companies: systematic review of the literature. *Cogent Engineering*, 11(1). <https://doi.org/10.1080/23311916.2024.2380344>
- Medara, R., Singh, R. S., & Sompalli, M. (2022). Energy and cost aware workflow scheduling in clouds with deadline constraint. *Concurrency and Computation: Practice and Experience*, 34(13). <https://doi.org/10.1002/cpe.6922>
- Mittal, P., & Gautam, S. (2023). Logistic Regression and Predictive Analysis in Public Services of AI Strategies. *TEM Journal*, 751–756. <https://doi.org/10.18421/TEM122-19>
- Mkhatshwa, B., & Mawela, T. (2023). Cloud Computing Adoption in the South African Public Sector. *Indonesian Journal of Electrical Engineering and Informatics (IJEI)*, 11(2). <https://doi.org/10.52549/ijeei.v11i2.4464>
- Mohd Ruzman, N. I., Azizan, N. I., Zakri, N. I., & Abdullah, N. N. (2023). *The Study of Factors Influencing The Adoption of E-Payment Among Youth in Kelantan* [Universiti Malaysia Kelantan]. <http://discol.umk.edu.my/id/eprint/12313>
- Monsef, B., & Hanan, E. B. (2024). A resilient inter-organizational workflow assignment plan

- selection approach: Application to a digital health use case. *International Journal of Engineering Business Management*, 16. <https://doi.org/10.1177/18479790231224909>
- Moron, C. E., & Diokno, C. O. B. (2023). Level of Readiness and Adoption on the Use of Artificial Intelligence Technologies in the Accounting Profession. *Open Journal of Accounting*, 2018, 37–54. <https://doi.org/10.4236/ojacct.2023.123004>
- Mwangi, J., Wall, J., Ismail, U., & Al-Nemrat, A. (2025). Building a Human-Centric SOC: A New Framework for Success. In *Advanced Sciences and Technologies for Security Applications* (pp. 537–558). Springer. https://doi.org/10.1007/978-3-031-82031-1_27
- N’goran, R., Tetchueng, J.-L., Pandry, G., Kermarrec, Y., & Asseu, O. (2022). Trust Assessment Model Based on a Zero Trust Strategy in a Community Cloud Environment. *Engineering*, 14(11), 479–496. <https://doi.org/10.4236/eng.2022.1411036>
- Nadia Tabassum, Humaria Naeem, & Asma Batool. (2023). The Data Security and multi-cloud Privacy concerns. *International Journal for Electronic Crime Investigation*, 7(1), 49–58. <https://doi.org/10.54692/ijeci.2023.0701128>
- Nanayakkara, S., Perera, S., Senaratne, S., Weerasuriya, G. T., & Bandara, H. M. N. D. (2021). Blockchain and smart contracts: A solution for payment issues in construction supply chains. *Informatics*, 8(2). <https://doi.org/10.3390/informatics8020036>
- Nguyen, M. P., Thai, V. Van, Chan, C., Lau, K. H., Nguyen, M. T. N., & Do, H. P. N. (2025). The interplay among trust, reciprocity and commitment factors in facilitating supply chain collaboration: the case of Vietnamese fishery industry. *Asia Pacific Journal of Marketing and Logistics*, 37(1), 150–170. <https://doi.org/10.1108/APJML-04-2024-0445>
- Nguyen, T.-V., Lê, L.-S., Shah, S. A., Hameed, S., & Draheim, D. (2023). PenChain: A Blockchain-Based Platform for Penalty-Aware Service Provisioning. *IEEE Access*, 12(November 2023), 1–1. <https://doi.org/10.1109/access.2023.3344038>
- OECD. (2025). *Digital transformation of public procurement: Good practice report*. OECD Publishing.
- Ogedengbe, A. O., Olawale, H. O., Ameyaw, M. N., Jejenewa, T. O., & Friday, S. C. (2024). Embedding Ethical Conduct, Fiduciary Responsibility, and Compliance Culture in Insurance Sales and Brokerage. *International Journal of Multidisciplinary Research and Growth Evaluation*, 5(5), 1143–1162. <https://doi.org/10.54660/IJMRGE.2024.5.5.1143-1162>
- Oliveira, N., & Lumineau, F. (2019). The Dark Side of Interorganizational Relationships: An Integrative Review and Research Agenda. *Journal of Management*, 45(1), 231–261. <https://doi.org/10.1177/0149206318804027>
- Omol, E. J. (2024). Organizational digital transformation: from evolution to future trends. *Digital Transformation and Society*, 3(3), 240–256. <https://doi.org/10.1108/DTS-08-2023-0061>
- Öri, D., Szabó, I., Kő, A., & Kovács, T. (2024). Digitalizing in crisis: the role of organizational resilience in SMEs’ digitalization. *Journal of Enterprise Information Management*, 37(4), 1185–1205. <https://doi.org/10.1108/JEIM-03-2023-0141>
- Paduraru, C., Cernat, M., & Staicu, A.-N. (2025). A Unified Framework for Automated Testing of Robotic Process Automation Workflows Using Symbolic and Concolic Analysis. *Machines*, 13(6), 504. <https://doi.org/10.3390/machines13060504>
- Peralta, A., Olivas, J. A., Romero, F. P., & Navarro-Illana, P. (2025). Intelligent Incident Management Leveraging Artificial Intelligence, Knowledge Engineering, and Mathematical Models in Enterprise Operations. *Mathematics*, 13(7), 1055. <https://doi.org/10.3390/math13071055>
- Piduru, B. R. (2022). Cloud Computing and Public Sector Transformation: Revolutionizing

- Governmental Services and Operations. *Journal of Artificial Intelligence & Cloud Computing*, 1–4. [https://doi.org/10.47363/JAICC/2022\(1\)192](https://doi.org/10.47363/JAICC/2022(1)192)
- Pramuja, R. A., Wibowo, A. P., & Suhermanto, D. F. (2021). The Driving Factors of Public's Interest in The Use of QRIS to Achieve Cashless Society. *Optimum: Jurnal Ekonomi Dan Pembangunan*, 11(2), 181. <https://doi.org/10.12928/optimum.v11i2.4656>
- Qazi, F., Kwak, D., Khan, F. G., Ali, F., & Khan, S. U. (2024). Service Level Agreement in cloud computing: Taxonomy, prospects, and challenges. *Internet of Things (Netherlands)*, 25(October 2023), 101126. <https://doi.org/10.1016/j.iot.2024.101126>
- Rasool, F., Greco, M., Morales-Alonso, G., & Carrasco-Gallego, R. (2023). What is next? The effect of reverse logistics adoption on digitalization and inter-organizational collaboration. *International Journal of Physical Distribution & Logistics Management*, 53(5/6), 563–588. <https://doi.org/10.1108/IJPDLM-06-2022-0173>
- Rekunenko, I., Kobushko, I., Dzydzyguri, O., Balahurovska, I., Yurynets, O., & Zhuk, O. (2025). The Use of Artificial Intelligence in Public Administration: Bibliometric Analysis. *Problems and Perspectives in Management*, 23(1), 209 – 224. [https://doi.org/10.21511/ppm.23\(1\).2025.16](https://doi.org/10.21511/ppm.23(1).2025.16)
- Rico, C. I. V., & Laukyte, M. (2024). ETIAS system and new proposals to advance the use of AI in public services. *Computer Law and Security Review*, 54. <https://doi.org/10.1016/j.clsr.2024.106015>
- Rizvi, S., & Williams, I. (2024). Analyzing transparency and malicious insiders prevention for cloud computing environment. *Computers & Security*, 137, 103622. <https://doi.org/10.1016/j.cose.2023.103622>
- Sandner, P., Lange, A., & Schulden, P. (2020). The Role of the CFO of an Industrial Company: An Analysis of the Impact of Blockchain Technology. *Future Internet*, 12(8), 128. <https://doi.org/10.3390/fi12080128>
- Santos, R., Brandão, A., Veloso, B., & Popoli, P. (2024). The use of AI in government and its risks: lessons from the private sector. *Transforming Government: People, Process and Policy*. <https://doi.org/10.1108/TG-02-2024-0038>
- Sanusi, S., Ghazali, A. W., Azahar, N. F. N., Aman, A., Fernandez, D., & Adznan, S. (2022). The Effect of Covid-19 Pandemic on the Global Business Services Industry in Malaysia: Surviving the Business Onslaught. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 12(4), 1435–1454. <https://doi.org/10.6007/ijarafms/v12-i4/15765>
- Shakeel, S. I., Haolader, M. F. A., & Sultana, M. S. (2023). Exploring dimensions of blended learning readiness: Validation of scale and assessing blended learning readiness in the context of TVET Bangladesh. *Heliyon*, 9(1). <https://doi.org/10.1016/j.heliyon.2022.e12766>
- Shava, E., & Mhlanga, D. (2023). Mitigating bureaucratic inefficiencies through blockchain technology in Africa. *Frontiers in Blockchain*, 6(January), 1–11. <https://doi.org/10.3389/fbloc.2023.1053555>
- Shukla, S., Hassan, M. F., Tran, D. C., Akbar, R., Paputungan, I. V., & Khan, M. K. (2023). Improving latency in Internet-of-Things and cloud computing for real-time data transmission: a systematic literature review (SLR). *Cluster Computing*, 26(5), 2657–2680. <https://doi.org/10.1007/s10586-021-03279-3>
- Story, M., Webb, P., Fletcher, S. R., Tang, G., Jaksic, C., & Carberry, J. (2022). Do Speed and Proximity Affect Human-Robot Collaboration with an Industrial Robot Arm? *International Journal of Social Robotics*, 14(4), 1087–1102. <https://doi.org/10.1007/s12369-021-00853-y>

- Syed, R., & Wynn, M. T. (2020). *How to Trust a Bot: An RPA User Perspective* (pp. 147–160). https://doi.org/10.1007/978-3-030-58779-6_10
- Tilbury, J., & Flowerday, S. (2024). Automation Bias and Complacency in Security Operation Centers. *Computers*, 13(7), 165. <https://doi.org/10.3390/computers13070165>
- Tiron-Tudor, A., Deliu, D., Farcane, N., & Dontu, A. (2021). Managing change with and through blockchain in accountancy organizations: a systematic literature review. *Journal of Organizational Change Management*, 34(2), 477–506. <https://doi.org/10.1108/JOCM-10-2020-0302>
- Tomar, P., & Grover, V. (2024). Robotic Process Automation. In *Intelligent Computing and Optimization for Sustainable Development* (pp. 238–251). *Chapman and Hall/CRC*. <https://doi.org/10.1201/9781032625829-14>
- Tsouplaki, A., & Kalloniatis, C. (2024). *From Exposure to Expertise: Enhancing Cybersecurity Training in the Internet of Cloud (IoC)*. 63–69. <https://doi.org/10.1145/3716554.3716564>
- Udoikah, J. M., Nwuzor, C. I., Nwambe, S. N., Nwokwu, P. M., Ogo, E. D., Nkwede, V. I., Nwoba, M. O. E., & Ndu, M. U. (2024). Treasury Single Account and Reduction of Financial Leakages in the Nigerian Custom Service. *Nigerian Journal of Social Psychology*, 7(1), 59–75. www.nigerianjisp.com
- Vedapradha, R., & Ravi, H. (2023). Blockchain: an EOM approach to reconciliation in banking. *Innovation and Management Review*, 20(1), 17–27. <https://doi.org/10.1108/INMR-05-2020-0060>
- Waizenegger, L., & Techatassanasoontorn, A. A. (2022). When robots join our team: A configuration theory of employees' perceptions of and reactions to Robotic Process Automation. *Australasian Journal of Information Systems*, 26. <https://doi.org/10.3127/ajis.v26i0.3833>
- Wamba, S. F., Wamba-Taguimdje, S. L., Lu, Q., & Queiroz, M. M. (2024). How emerging technologies can solve critical issues in organizational operations: An analysis of blockchain-driven projects in the public sector. *Government Information Quarterly*, 41(1), 101912. <https://doi.org/10.1016/j.giq.2024.101912>
- Wang, J., Liu, J., Sun, Q., Yan, T., An, D., & Qi, F. (2023). A distributed framework for security operation center in the application of Institute of High Energy Physics. *Proceedings of Science*, 434. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85178636496&partnerID=40&md5=23c9fc035c80b5c856fb15cf26847e62>
- Wei Jun, L., & Kamaruddin, N. K. (2023). A Foresight Study on Adoption of Blockchain Technology among Logistics Industry. *Research in Management of Technology and Business*, 4(1), 282–297. <http://publisher.uthm.edu.my/periodicals/index.php/rmtb>
- Weigand, H., Blums, I., & Kruijff, J. de. (2020). Shared Ledger Accounting — Implementing the Economic Exchange pattern. *Information Systems*, 90(xxxx), 101437. <https://doi.org/10.1016/j.is.2019.101437>
- Weitz, K., Schlagowski, R., André, E., Männiste, M., & George, C. (2024). Explaining It Your Way - Findings from a Co-Creative Design Workshop on Designing XAI Applications with AI End-Users from the Public Sector. *Conference on Human Factors in Computing Systems - Proceedings*. <https://doi.org/10.1145/3613904.3642563>
- Wewerka, J., & Reichert, M. (2023). Robotic process automation - a systematic mapping study and classification framework. *Enterprise Information Systems*, 17(2). <https://doi.org/10.1080/17517575.2021.1986862>
- Wiesweg, N., Schäpers, P., Bernhold, T., & Hartmann, T. (2022). On the Challenges of Inter-

- Organisational Data in Real Estate: The Role of Knowledge Sharing. *Engineering Construction & Architectural Management*. <https://doi.org/10.1108/ecam-12-2021-1081>
- William, P., & Mothukuri, T. (2023). A Comprehensive Analysis of Cloud Computing Impact on Digital Transformation in E-India. *SciWaveBulletin*, 01(02), 35–40. <https://doi.org/10.61925/SWB.2023.1205>
- Wlodyka, E. M. (2024). Implementation of e-Government and Artificial Intelligence in Polish Public Administration. *TalTech Journal of European Studies*, 14(2), 118 – 136. <https://doi.org/10.2478/bjes-2024-0019>
- Xu, B., Cai, Z., Lim, E. T. K., Song, X., Chong, A., Tan, C.-W., & Yu, J. (2020). Artificial intelligence or augmented intelligence: A case study of Human-AI collaboration in operational decision making. *Proceedings of the 24th Pacific Asia Conference on Information Systems: Information Systems (IS) for the Future, PACIS 2020*. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85089128997&partnerID=40&md5=e9ffbf47fe8e51d8b2a52c27b93649da>
- Yadlapalli, A., Rahman, S., & Gopal, P. (2022). Blockchain technology implementation challenges in supply chains – evidence from the case studies of multi-stakeholders. *International Journal of Logistics Management*, 33(5), 278–305. <https://doi.org/10.1108/IJLM-02-2021-0086>
- Yigitcanlar, T., David, A., Li, W., Fookes, C., Bibri, S. E., & Ye, X. (2024). Unlocking Artificial Intelligence Adoption in Local Governments: Best Practice Lessons from Real-World Implementations. *Smart Cities*, 7(4), 1576 – 1625. <https://doi.org/10.3390/smartcities7040064>
- Yu, J. (2024). Exploration of the application of blockchain in e-government: Opportunities and risks coexist. *Information Services and Use*, 44(3), 255 – 266. <https://doi.org/10.3233/ISU-240013>
- Zairul, M. (2020). A thematic review on student-centred learning in the studio education. *Journal of Critical Reviews*, 7(2), 504–511. <https://doi.org/10.31838/jcr.07.02.95>
- Zairul, M. (2021). The recent trends on prefabricated buildings with circular economy (CE) approach. *Cleaner Engineering and Technology*, 4. <https://doi.org/10.1016/j.clet.2021.100239>
- Zairul, M., & Zaremohzzabieh, Z. (2023). Thematic Trends in Industry 4.0 Revolution Potential towards Sustainability in the Construction Industry. *Sustainability (Switzerland)*, 15(9). <https://doi.org/10.3390/su15097720>
- Zhang, L., Xie, Y., Zheng, Y., Xue, W., Zheng, X., & Xu, X. (2020). The challenges and countermeasures of blockchain in finance and economics. *Systems Research and Behavioral Science*, 37(4), 691–698. <https://doi.org/10.1002/sres.2710>