

DIGITAL PAYMENT FOR ALL: A SLR AND BIBLIOMETRIC STUDY OF THE CONSTRAINTS AND STRATEGIES OF EXPANSION OF ETPD, QRIS, AND REALTIME PAYMENT IN SUMATERA - A GLOBAL PERSPECTIVE

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Abstract. Development system digital payments have give contribution significant to transformation global economy, especially in push efficiency transactions, transparency of governance finance , and expansion inclusion finance . Research This aim For study constraints and expansion strategies digital payments , in particular Electronification Transaction Regional Government (ETPD), Quick Response Code Indonesian Standard (QRIS), and real-time payment , with use Systematic Literature Review (SLR) method and analysis bibliometrics to Scopus indexed publications in range 2015–2025 . Research results show that constraint main in implementation system digital payments include limitations infrastructure , low digital literacy , resistance culture against cash , the issue data security , as well as regulations that have not been adaptive . Factors that encourage success adoption covers trust to systems , interoperability , support regulation, availability infrastructure , as well as collaboration cross stakeholders interests . Recommended strategies covering strengthening regulations and standards security , improvement digital literacy , giving incentive economy , as well as adoption practice best international like Unified Payment Interface (UPI) India. Findings This give contribution academic to literature about transformation system digital payments , as well as implications practical for government , regulators, institutions finance , and actors business in speed up development ecosystem inclusive and sustainable digital finance.

Keywords: digital payments ; ETPD; QRIS ; real-time payments ; inclusion finance ; digital literacy ; bibliometrics ; SLRPage layout

1. Introduction

Development system digital payments in One decade final has bring change significant on the landscape global finance . Digitalization system payment No only increase efficiency transactions , but also opening opportunity big For expand inclusion financial , especially in developing countries . Transformation This the more relevant with presence various innovation like Electronification Transaction Regional Government (ETPD), Quick Response Code Indonesian Standard (QRIS), and Real-Time Payments (RTP) which are designed For facilitate non- cash transactions in a way fast , safe , and inclusive .

Although its potential big , implementation system digital payments in regional areas face diverse constraints . Limitations infrastructure and internet connectivity are still become problem main , especially in remote areas with minimal access technology (Abdulahi & Demisse, 2009; Husni & Hidayat, 2018; M. Li & Deniswara, 2024). In addition , the issue security and compliance to regulations also affect trust public in use system digital (Ayquipa et al., 2019)payments . Another obstacle that is not lost important is factor socio-cultural , such as preference public against cash as well as low digital literacy , which is still become challenge big in push change behavior transaction (Hillary et al., 2024; Ilankumaran & Selvi, 2019; Ramaiya et al., 2024). Temporary that , limitations budget and height cost investment often become factor a slowing economy acceleration development infrastructure digital payments in the region.

For overcome various constraint Therefore , a comprehensive strategy is needed . Strengthening infrastructure technology become condition main For expand range service digital payments in the region Implementation standard tight security as well as compliance regulations believed can increase trust public to system This (Abdulahi & Demisse, 2009; Ayquipa et al., 2019). On the other hand , digital literacy and education programs public need improved to address obstacle socio-cultural and encourage understanding about benefit

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digital (Hillary et al., 2024; Ramaiya et al., 2024) payments . In addition , support economy in the form of incentives and policies fiscal can become driver for government regions and sectors private For develop infrastructure as well as expand adoption technology digital payments.

In a more context specific , each instrument digital payments have challenge separately . ETPD, for example, has potential big in increase transparency and accountability management finance area , however limitations infrastructure Still hinder its implementation (Cooper et al., 2020; Goyal, 2015). QRIS as standard transaction QR code based has make it easier for MSMEs to adopt non- cash payments , although adoption Still hampered by perception risk , value , and trust (Hillary et al., 2024). Temporary that , RTP becomes instrument important For provide transaction instant , but its implementation Still face challenge in the form of expectation tall society and competition with method payment traditional (Arango-Arango et al., 2021; Buckley & Balakrishnan, 2020).

Based on condition said , research This done with use Systematic Literature Review (SLR) and Bibliometric methods For review in a way comprehensive various obstacles and strategies in expand Implementation of ETPD, QRIS, and RTP in the regions . Study results This expected can give outlook academic as well as recommendation practical for maker policies , institutions finance , and providers technology in increase inclusion finance as well as speed up development economy area through optimization system digital payments.

2. Literature Review

Development digital technology has bring change significant in system global payments . According to (Mützel & Unternährer, 2024), digital payments are defined as use method electronic For do transaction finance , in general through applications on smartphones or other digital devices .(Ortiz, 2024) confirm that digital payments are form transactions made in a way electronics , replacing cash usage or check physical . Next ,(Ding et al., 2025) expand coverage definition This with explain that digital payments no only limited to transactions consumption , but also includes purchase services , investments , to payment salary . With Thus , literature previously show that digital payments have an increasing role wide in life society , business , and sector government.

In the Indonesian context , one of the instrument important is Electronification Transaction Regional Government (ETPD).(Sinulingga, 2025) explain that ETPD is initiative strategic in framework policy national Acceleration and Expansion Regional Digitalization (P2DD), which aims For strengthen digital economy at the regional level as well increase effectiveness management finance public . In line with That ,(Zahra & Riyentin, 2024) highlight that ETPD policy is directed For increase electronification transactions in the environment government area , with potential give impact positive to literacy finance public as well as improvement income original area .(Burhan & Gunadi, 2023) add that ETPD is effort government area in digitize transaction reception and expenditure area with method transition from system cash to system non-cash . This effort No only increase efficiency and effectiveness , but also emphasizes aspect transparency , security , and reliability in administration finance area.

Apart from ETPD, other innovations play a role big in support ecosystem digital payment is QRIS (Quick Response Code Indonesian Standard). Based on study (Khameswara et al., 2023; Musyaffi et al., 2021a; Wiryawan et al., 2023)QRIS was developed by Bank Indonesia as a payment platform integrated uniting various system payment to in One standard . QRIS makes it easier public in do transaction Enough with scan One QR code that can accessible through gallery cell phone clever they . The presence of QRIS is expected can increase efficiency , interoperability between provider service payments , as well as expand access public to service digital finance .

In a way overall , research previously show that digitalization payment through instrument like digital payments , ETPD, and QRIS have significant impact to improvement inclusion finance , governance efficiency finance , as well as acceleration transformation digital economy at the regional and national levels national.

Table 1. Study previously.

No.	Writer	Study previously
1	(Mützel & Unternährer , 2024)	Digital payments refer to the use of method electronic For do transaction finance , usually through applications on smartphones or other devices .
2	(Ortiz, 2024)	Digital payments refer to transactions made in a way electronics , not using cash or check physique ..
3	(Ding et al., 2025)	Payment digital involves various type transactions , such as purchase commodities or services , investments and payments wages .
4	(Sinulingga, 2025)	Electronification Transaction Regional Government (ETPD) is defined as initiative significant in framework policy national For Acceleration and Expansion Regional Digitalization (P2DD), which aims to increase digital economy at the regional level and improve effectiveness management finance public in a way overall
5	(Zahra &	ETPD is policies that aim For increase electronification transactions in the

	Riyentin , 2024)	environment government area For potential increase literacy finance and income area
6	(Burhan & Gunadi, 2023)	ETPD is efforts made by the government area For digitize transaction income and expenses area , transition from transaction cash to transaction cashless For increase efficiency , effectiveness , transparency , security , and reliability administration government area , which aims to For accelerate and expand transaction electronics in the area .
7	(Khameswara et al., 2023; Musyaffi et al., 2021b; Wiryawan et al., 2023)	QRIS is a payment platform integrated system developed by Bank Indonesia for streamline digital transactions in various system payment . This allows users For do transaction with fast and efficient with scan QR code , which is saved in the gallery cell phone intelligent they

3. Research Methods

3.1 Research Design

This study uses a Systematic Literature Review (SLR) and bibliometric approach analyzed from search results conducted in online databases to analyze research trends on digital payments , QRIS, ETPD, real-time payments and analyzed in VOSviewer. The data source for this study comes from Scopus-indexed literature. Data retrieval was carried out through internet surfing from Scopus. The data source for this study consists of journals that discuss obstacles and strategies in the use of digital payments , QRIS, ETPD and Real-time payments . The articles evaluated were collected from various publishers or publishers of well-known international journals and with the highest citations.

A Systematic Literature Review (SLR) is the process of finding, assessing, and interpreting all available research evidence to answer a specific research question. The initial guidelines proposed by (Kitchenham & Charters, 2007)served as the basis for this literature review.

3.2 Research Question

Question study arranged with help criteria Population , Intervention , Comparison (Comparison) , Results (Results) , And Context (Context) , abbreviated with PICOC. Objective from question study This is For ensure that review systematically carried out still focus (Kitchenham & Charters, 2007). Table 1. shows PICOC structure of question study about Systematic Literature Review: Obstacles and Strategies for Expanding ETPD, QRIS, and Real-Time Payment in Sumatra – A Global Perspective.

Table 2. PICOC Summary of Constraints and Strategies for Expanding ETPD, QRIS, and Real-Time Payment in Sumatra – A Global Perspective.

Population	Society, actors businesses (SMEs, consumers , institutions) finance) , as well as regulators in various countries that use or develop system digital payments .
Intervention	Implementation and adoption system digital payments , especially ETPD, QRIS, and <i>real-time payments</i> .
Comparison	Comparison between successful countries / regions expand system digital payments with which still face obstacle .
Outcomes	Obstacles faced and the strategies implemented For expand inclusion and effectiveness digital payments .
Context	Condition social , economic , digital infrastructure , literacy finance , and regulations in various countries, especially in context adoption digital payments in the region .

Research question Which built on study This like stated on table 2. below This

Table 3. Research Question in Literature Review.

ID	Research Question (RQ)	Motivation
RQ1	journals are most relevant related constraints and strategies for expanding ETPD, QRIS, and <i>real- time payments</i> in global perspective ?	Identification the most relevant journals focusing on adoption barriers and strategies digital payments in various countries.
RQ2	What are the topics and trends study main thing that appears related What are the constraints and strategies for expanding ETPD, QRIS, and	Identification topic research and global trends in adoption as well as development system digital payments .

	<i>real-time payments?</i>	
RQ3	What factors only that affects success or failure expansion system digital payments in the region in global context ?	Identification factors key like regulation , literacy finance , behavior consumers , infrastructure , and support technology .
RQ4	What strategies are proposed ? For overcome obstacles and speed up adoption digital payments (ETPD,	Identify strategies and recommendations provided by the research international For expand system inclusive digital payments .

Table 2 shows the approach used to map the constraints and strategies for expanding digital payment systems, specifically ETPD, QRIS, and real-time payments, across various regions from a global perspective. This approach was designed to answer research questions RQ1 to RQ4. This approach allows us to determine significant aspects in the literature and identify contributions from previous research that can be used to broaden the scope and context of the study.

3.3 Mind Map

To identify barriers and strategies for expanding digital payment systems, a key idea map derived from the bibliometric study and systematic literature review is presented below. The primary focus is to identify the most critical elements influencing the adoption and successful implementation of digital payments in the regions, including social, economic, infrastructure, regulatory, and financial literacy factors. Furthermore, this idea map helps identify strategies to maximize opportunities and mitigate barriers to the expansion of ETPD, QRIS, and real-time payments.

RQ1: Significance of Journal

RQ2: Most dominant constraints

RQ3 : Outstanding opportunities

RQ4 : Recommended strategy

3.4 Search Strategy

The framework used in SLR to organize and transparently report research results is PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). This aims to ensure comprehensive, transparent, and accurate reporting of research methodology and results. The following is the PRISMA that researchers have implemented to obtain articles for subsequent analysis of their findings.

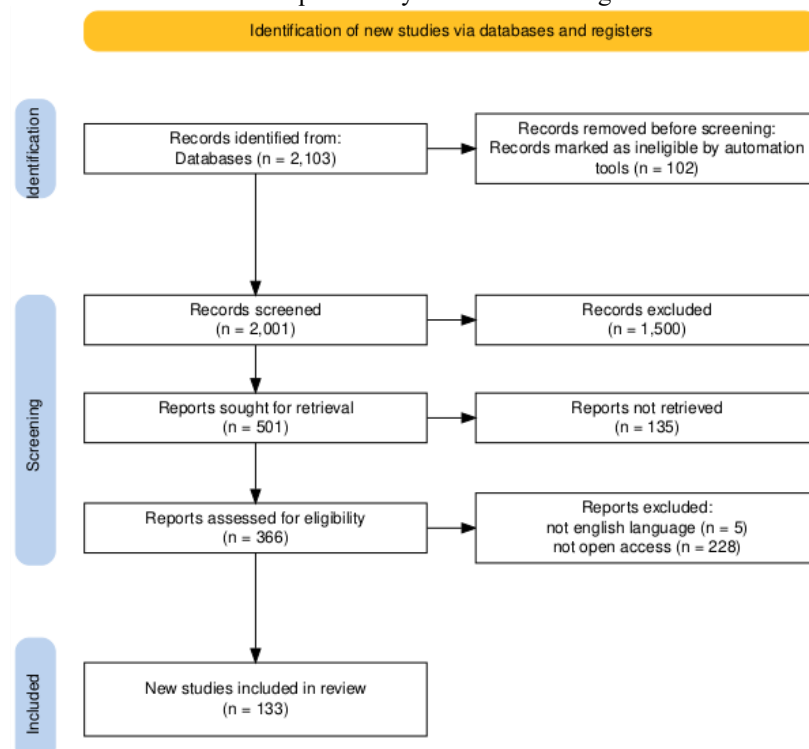


Figure 1. PRISMA study flow diagram

The study selection process for this research followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. In the initial identification stage, 2,001 articles were screened. The study selection process followed PRISMA guidelines. Of the initial 2,103 articles in Scopus, 102 were automatically eliminated, leaving 2,001 for screening. After title and abstract screening, 1,500 articles were excluded, leaving 501 for full review. Of these, 135 were inaccessible, leading to further evaluation of 366 articles for eligibility. A total of 233 were eliminated (5 non-English language, 228 not open access), leaving 133 studies for final inclusion. This rigorous selection process ensured quality, relevance, and reduced bias in the studies.

3.5 Research Objects and Subjects

The researcher determined the object of bibliometric research, namely scientific publications obtained through Scopus with the keywords "Digital payment", "QRIS", "ETPD" and "Realtime payment" and to collect SLR data the researcher collected articles from the Scopus database, the scientific publications were published in a ten-year period, namely 2015-2025, while the type of publication is a journal. The criteria set by the researcher are, research areas that discuss digital payments, QRIS, ETPD and realtime payments in the field of social science.

3.6 Research Instruments

Relevant scientific publications will be analyzed by following the PRISMA 2020 Checklist guidelines sourced from: <http://prismastatement.org/> this is done to answer RQ1 to RQ4.

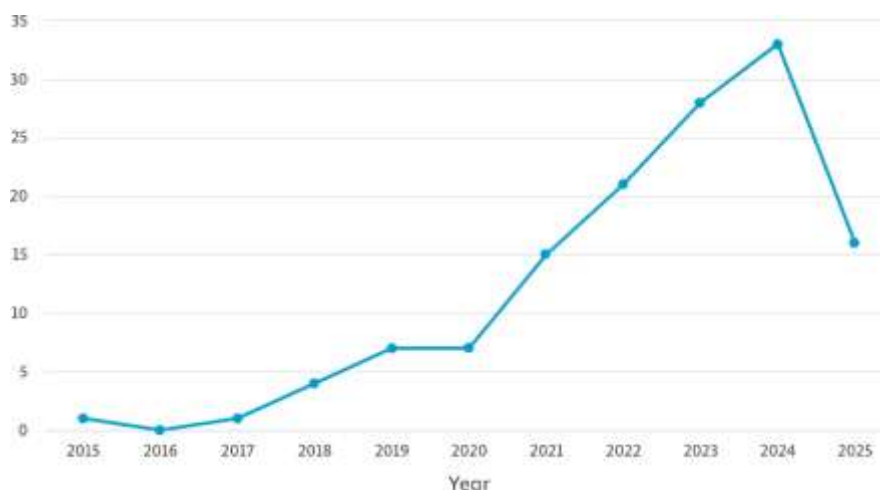
3.7 Data collection technique

Based on the formulation of the problem and the research objectives that have been determined, the data collection techniques used in this research are SLR and bibliometrics.

4. Result and Discussion

4.1 Number of publications by year (2015–2025)

Bibliometric analysis shows that there are 133 documents discussing the topic of digital payments (ETPD, QRIS, and *real-time payments*) in the period 2015 to 2025. The following is a picture of the number of publications based on the years 2015 - 2025

**Figure 2.** Number of publications based on the years 2015-2025

Based on the data in Figure 2, bibliometric analysis shows that there are 133 documents discussing the topics of digital payments, ETPD, QRIS, and *real-time payments* between 2015 and 2025. The trend in the number of publications has increased significantly from year to year, although there are some variations. In 2015, only one research document was identified, indicating that the issue of digital payments was still relatively new and had not yet become a primary focus of academic research. Even in 2016, no related publications were found, indicating that attention to this issue was still very limited. From 2017 to 2019, the number of documents increased gradually

from 1 publication (2017), 4 publications (2018), and 7 publications (2019). This phase can be seen as the initial period of adoption of digital payment systems in various countries, especially with the increasing internet penetration and the use of mobile banking and fintech. In 2020, the number of publications remained stable at 7 documents. The COVID-19 pandemic that year was a driving factor in the widespread adoption of digital payments in society, although the number of academic publications did not show a significant increase. However, starting in 2021, there was a significant increase with 15 publications, followed by a continued upward trend in 2022 (21 publications) and 2023 (28 publications). This surge indicates that academic attention to the role of digital payments is growing, particularly in the context of financial inclusion, economic digitalization, and strategies to reduce dependence on cash transactions. The peak number of publications occurred in 2024, with 33 papers. This reflects the growing global attention to digital payment issues, both in terms of opportunities and challenges, including regulatory aspects, financial literacy, digital infrastructure, and standardization efforts such as the implementation of QRIS and real-time payments. Meanwhile, in 2025 (as of August), the number of identified documents was 16. This figure does appear to decrease compared to 2024, but it should be noted that the 2025 data does not cover the entire year. Thus, there is still a possibility that the number of publications will increase until the end of the year and approach or even exceed the previous year's achievements.

Overall, the publication trend from 2015–2025 shows an exponential growth pattern. From just one publication in 2015, the number increased rapidly to 33 in 2024, representing a more than 30-fold increase in less than a decade. This confirms that digital payments have become a strategic issue in global research, particularly in the context of expanding financial access, equitable distribution of the digital economy, and efforts to support financial inclusion in the regions.

4.2 Distribution of Publications by Country (2015–2025)

Bibliometric analysis shows that of the 133 identified documents, research on digital payments is spread across more than 45 countries. However, the contribution of publications is uneven, with some countries being the primary focus of research. The following is a graph of the distribution of publications by country from 2015 to 2025.

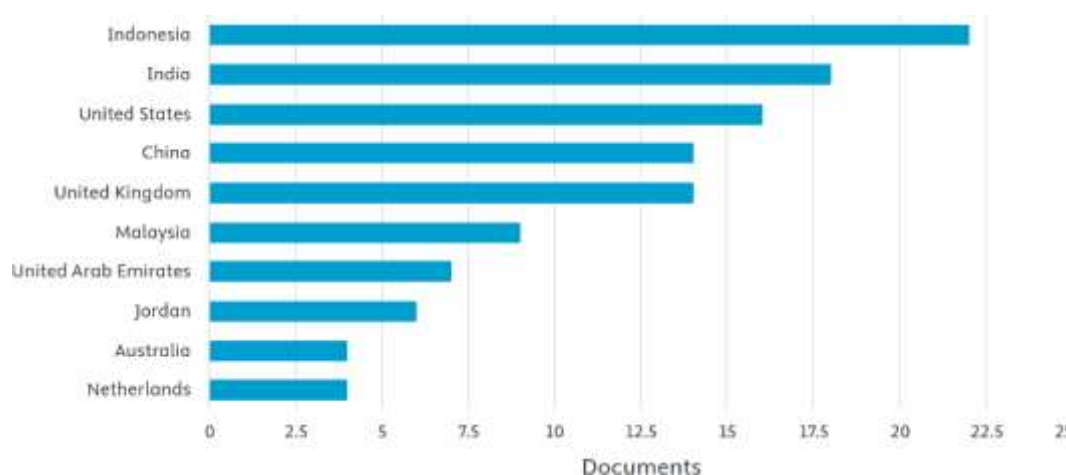


Figure 3. Distribution of Publications by Country 2015–2025

Figure 3 shows that Indonesia tops the list with 22 publications. This dominance reflects the strong academic focus on the implementation of digital payment systems in Indonesia, particularly regarding QRIS (*Quick Response Code Indonesian Standard*), one of the largest regulatory innovations in Southeast Asia in digital payment integration. Indonesia's position as a country with a large population, high fintech penetration, and aggressive cashless society policies have also driven the rise of academic research in both national and global contexts.

In second place, India produced 18 publications. India is a pioneer in developing a *real-time payment system* through the globally recognized *Unified Payments Interface* (UPI). UPI's success in increasing financial inclusion, particularly in rural areas, has made India a widely researched case study.

Furthermore, the United States (16 publications), China (14 publications), and the United Kingdom (14 publications) were the three countries with significant contributions. Publications from these three countries generally focused on technology, cybersecurity, digital financial services innovation, and cross-border regulations. The United States focused heavily on *fintech innovation* and adoption in the private sector, while China emphasized research on WeChat Pay and Alipay as key drivers of its domestic digital economy. The United Kingdom, as a global financial center, focused more on policy, regulation, and open banking.

Southeast Asian countries also made significant contributions, such as Malaysia (9 publications) and Thailand (4 publications). The focus of research in this region is largely related to regional strategies towards cross - border digital payment integration , which aligns with the ASEAN agenda.

In the Middle East, the United Arab Emirates (7 publications), Jordan (6 publications), and Saudi Arabia (4 publications) play a significant role. This contribution is closely related to the digital transformation that is part of Vision 2030 in Saudi Arabia and the *Smart City Project* in Dubai, where digital payments are the backbone of the digital economy ecosystem. Meanwhile, European countries such as the Netherlands, Germany, Greece, Hungary, and Sweden, despite their relatively smaller number of publications (2–4 documents), still play a significant role because their research focuses on regulatory aspects, transaction security, and the interoperability of cross-border payment systems. Several other developing countries, such as Nigeria (4 publications), Bangladesh (2 publications), Pakistan (2 publications), and Vietnam (2 publications), demonstrate that the issue of expanding digital payments is also a key agenda in the Global South. Publications from these countries primarily address infrastructure constraints, financial literacy, and adoption in rural communities. Interestingly, there are also relatively small contributions from countries with one document each, such as Japan, South Korea, Brazil, South Africa, Palestine, and Kyrgyzstan. Although limited, the existence of this publication confirms that digital payments are a global and cross-regional issue, not just a monopoly of countries with large economies.

Overall, this distribution indicates that digital payments research is growing globally, with a strong concentration in Asia, particularly South Asia (India), East Asia (China), and Southeast Asia (Indonesia, Malaysia, and Thailand). The fact that Indonesia leads the number of publications demonstrates its strategic position in the global research landscape on ETPD, QRIS, and *real-time payments* , and also reinforces the motivation for this study to provide a more in-depth review from both a global and regional perspective.

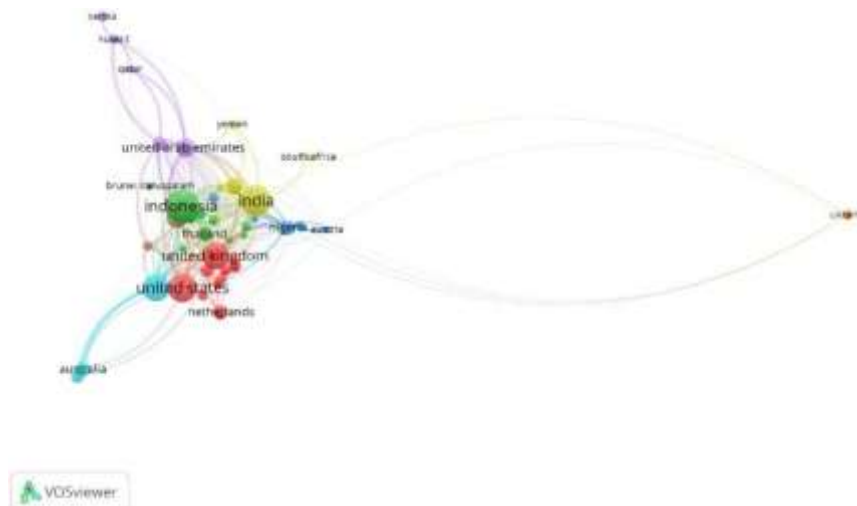


Figure 4. Network Visualization of Countries

Based on Figure 4, the results of bibliometric mapping using VOSviewer show five main clusters that are interconnected in research on digital payments, specifically related to ETPD, QRIS, and real-time payments. The green cluster is dominated by India and Indonesia, which appear as centers with large node sizes. Their positions indicate a high intensity of publications and collaborations in South and Southeast Asia. Within this cluster, India and Indonesia are also connected to Thailand, Brunei Darussalam, and the United Arab Emirates, demonstrating Asia's strong role in discussions about digital payment systems. The red cluster shows the dominance of the United States and the United Kingdom as global actors with extensive connections to various other countries, including Asia and Europe. The connection with the Netherlands and several other countries indicates that literature on digital payments was largely initiated in the West and then expanded to developing countries. The purple cluster, centered on the United Arab Emirates, includes countries such as Qatar, Kuwait and Serbia. This cluster reflects attention to issues of Islamic finance and digital fiscal regulation relevant to the Middle East region.

Furthermore, the blue cluster displays African countries such as Nigeria and South Africa, which are closely connected to India, the UK, and the US. This confirms that research on digital payments in Africa is primarily focused on financial inclusion strategies and expanding access to digital payments in developing countries. Meanwhile, the orange cluster only displays Ukraine, which is relatively isolated from the larger network, although still connected to several key countries. This indicates a more limited research focus, likely related to adapting real-time payments within specific geopolitical contexts.

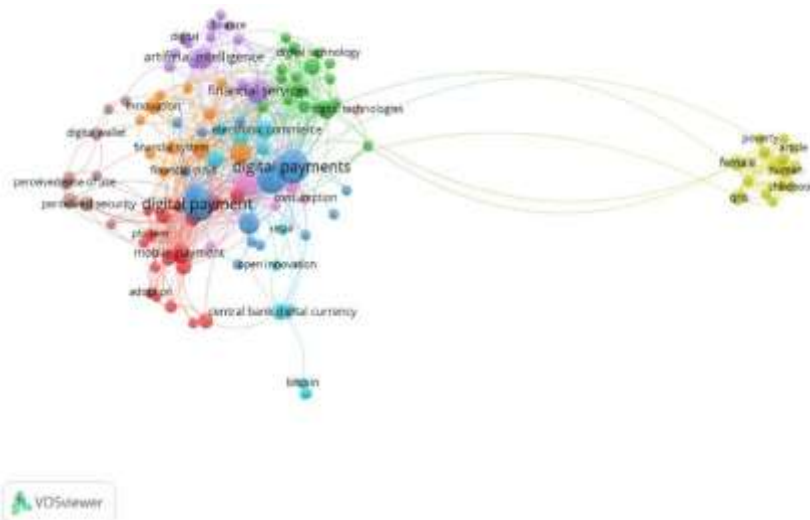


Figure 5. co-occurrence keyword

Based on Figure 5, the keyword co-occurrence map shows several main clusters in research related to digital payments, ETPD, QRIS, and real-time payments:

1. **Blue cluster (digital payment & e-commerce)**
This cluster focuses on the keyword digital payments, closely linked to *consumption*, *retail*, *electronic commerce*, and *open innovation*. This demonstrates the research's focus on usage, integration with *e-commerce*, and the role of innovation in driving the adoption of digital payment systems.
2. **Red cluster (adoption & mobile payment)**
This cluster is led by the keywords *digital payment*, *mobile payment*, *adoption*, *perceived ease of use*, and *perceived security*. This theme focuses more on factors of technology acceptance, particularly from a user perspective. Consumer adoption, perceived security, and ease of use are central to the research.
3. **Green cluster (financial technology & digitalization)**
Dominant keywords in this cluster include *financial services*, *digital technologies*, *digital technology*, and *electronic commerce*. This cluster focuses on the link between digital payments and the transformation of financial services and the integration of digital technology into the broader economic system.
4. **Purple cluster (AI and financial systems)**
This cluster encompasses the keywords *artificial intelligence*, *digital*, *finance*, and *financial systems*. This research focuses on the use of intelligent technology to support financial system stability, service innovation, and risk management in the context of digital payments.
5. **Brown cluster (security & PLS-SEM)**
Key keywords here are *digital wallet*, *financial crisis*, *perceived security*, *perceived ease of use*, and *PLS-SEM*. This cluster demonstrates the focus of methodological research, particularly on adoption analysis using *Partial Least Squares-Structural Equation Modeling*, as well as the issue of consumer trust in *digital wallet security*.
6. **Yellow cluster (QRIS and social inclusion)**
This cluster is quite unique because it features keywords such as *qris*, *female*, *childhood*, *poverty*, *article*, and *human*. The research focus in this cluster links QRIS use to issues of social inclusion, gender equality, and poverty alleviation. This demonstrates a broadening perspective on digital payment studies, extending beyond technical and financial perspectives to include social and inclusive development.
7. **Separate nodes (Bitcoin & CBDC)**
Keywords like *bitcoin* and *central bank digital currency* (CBDC) appear somewhat separate from the main cluster. This position indicates more specific research on decentralized digital currencies and central bank initiatives, which, while related to digital payments, are often treated as a niche research area.

The results of this keyword mapping confirm that research on digital payments is developing in multiple, complementary directions. The blue and red clusters emphasize user adoption and consumer behavior, particularly in relation to *e-commerce*, *mobile payments*, and security perceptions. The green and purple clusters expand the study to the realm of technology and financial systems, including the use of artificial intelligence, digital technology integration, and the role of *financial services*. On the other hand, the brown cluster highlights the importance of research methodology and security issues, while the yellow cluster presents a broader perspective by linking digital payments (particularly QRIS) to issues of inclusivity, gender, and social development. The presence of bitcoin nodes and CBDCs demonstrates that although both are frequently discussed in the context of digital payments, the research direction is more independent and focuses on digital currency innovation.

Thus, this map demonstrates that *digital payments* are not just technological and financial issues, but are also closely linked to user adoption, regulation, security, and social inclusion. This reinforces the finding that strategies for expanding ETPD, QRIS, and *real-time payments* need to be formulated comprehensively, encompassing technological aspects, user behavior, and socio-economic impacts.

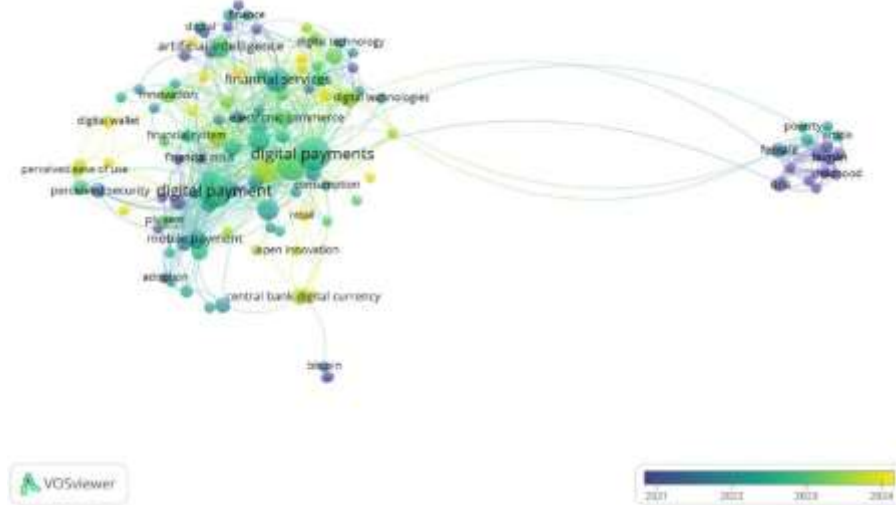
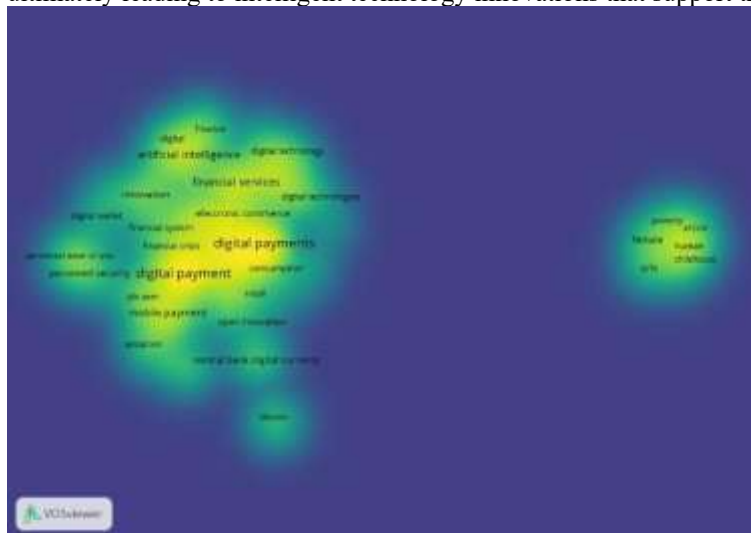


Figure 6. overlay visualization

Based on Figure 6, the overlay visualization results show the development of research on digital payments between 2021 and 2024. In the initial period (2021–2022), the focus of research was still largely directed at digital currencies such as Bitcoin and central bank digital currency (CBDC), as well as initial discussions on QRIS related to social aspects such as poverty, gender, and financial inclusion. These findings indicate that early-stage research focuses on the macro dimensions of global monetary policy and the role of digital payment systems in supporting inclusive development.

Entering the transition period (2022–2023), research began to shift to user adoption issues, as reflected in the dominance of keywords such as *mobile payment*, *digital wallet*, *adoption*, *perceived security*, and *perceived ease of use*. This period demonstrated that research placed greater emphasis on technology acceptance, security, and ease of use. Furthermore, the association with keywords such as *electronic commerce*, *retail*, and *consumption* indicates a stronger integration between digital payments and the e-commerce ecosystem.

In the most recent period (2023–2024), the yellow color indicates a research direction increasingly oriented toward the use of intelligent technology and the transformation of financial services. Keywords such as *artificial intelligence*, *financial services*, *digital technologies*, and *innovation* dominate, indicating that current issues are moving toward the integration of digital payment systems with artificial intelligence-based technologies and the modernization of the financial sector. Thus, the development of *digital payment research* can be mapped as moving from macro issues related to digital currency and social inclusion, to micro issues regarding user adoption, ultimately leading to intelligent technology innovations that support the global digital financial ecosystem.



Based on Figure 7, the density visualization results show that the term "*digital payment*" is the research focus with the highest density, indicated by the bright yellow color. This indicates that this term is the primary concept dominating the literature related to digital payment systems. Surrounding it, keywords such as "*mobile payment*,"

"financial services," "artificial intelligence," "digital wallet," "electronic commerce," as well as "perceived security" and "perceived ease of use" appear at medium to high densities. This pattern indicates that research focuses heavily on the implementation aspects of digital payments, both in terms of technology, financial services, and user adoption factors.

Furthermore, topics emerging with moderate intensity but increasing relevance in the literature include *central bank digital currency (CBDC)*, *open innovation*, *financial crisis*, and *bitcoin*. These keywords are in the green-blue area, indicating that, while not as intense as discussions on *digital payments* in general, these issues remain a significant part of the global research framework.

Interestingly, a separate cluster on the right side of the map shows the association between the keywords QRIS and *poverty*, *female*, *childhood*, *article*, and *human*. While lower in intensity than the main research focus, this position confirms that QRIS is beginning to be linked to social dimensions such as financial inclusion, gender equality, and its impact on community well-being. Thus, research on QRIS is viewed not only as a technical issue in digital payments but also as a strategic instrument in supporting more inclusive development.

Overall, this density visualization shows that research on digital payments focuses on technical aspects and technology adoption, with extensions to monetary innovations (such as CBDCs and Bitcoin) and social issues (such as QRIS and financial inclusion). This confirms that the digital payments discourse is evolving multidimensionally, encompassing technology, consumer behavior, financial policy, and the sustainable development agenda.

RQ1 Which journals are most relevant regarding the constraints and strategies for expanding ETPD, QRIS, and real-time payments from a global perspective?

Based on an analysis of 133 publications, 75 publications were identified as most relevant to the development of digital payment systems, specifically regarding the challenges and strategies for expanding ETPD, QRIS, and *real-time payments* in various countries. The following is a list of the most relevant journals related to the challenges and strategies for expanding ETPD, QRIS, and *real-time payments* from a global perspective.

Table 3. The most relevant journals related to the constraints and strategies for expanding ETPD, QRIS, and real-time payments from a global perspective

No	Author	Title Publication
1	Patil et al., 2020	Understanding Consumer Adoption Of Mobile Payment In India: Extending Meta-Link Model With Personal Innovativeness, Anxiety, Trust, And Grievance Redressal
2	Jiaxin Zhang et al., 2019	The Role Of Consumers' Perceived Security, Perceived Control, Interface Design Features, And Conscientiousness In Continuous Use Of Mobile Payment Services
3	Danladi et al., 2023	Attaining Sustainable Development Goals Through Financial Inclusion: Exploring Collaborative Approaches To Fintech Adoption In Developing Economies
4	Setor et al., 2021	Do Digital Payment Transactions Reduce Corruption? Evidence From Developing Countries
5	Mavlutova et al., 2023	Digital Transformation As A Driver Of The Financial Sector Sustainable Development: An Impact On Financial Inclusion And Operational Efficiency
6	Chaveesuk et al., 2021	Digital Payment System Innovations: A Marketing Perspective On Intention And Actual Use In The Retail Sector
7	Siagian et al., 2022	The Effect Of Perceived Security, Perceived Ease Of Use, And Perceived Usefulness On Consumer Behavioral Intention Through Trust In Digital Payment Platforms
8	Zhong & Moon, 2022	Investigating Customer Behavior Of Using Contactless Payment In China: A Comparative Study Of Facial Recognition Payment And Mobile QR-Code Payment
9	Klapper & Singer, 2017	The Opportunities And Challenges Of Digitizing Government-To-Person Payments
10	Dluhopolskyi et al., 2023	Digital Financial Inclusion: Covid-19 Impacts And Opportunities
11	Ferrari, 2022	The Platformisation Of Digital Payments: The Fabrication Of Consumer Interest In The EU Fintech Agenda
12	Chaveesuk et al., 2022	Continuance Intention To Use Digital Payments In Mitigating The Spread Of Covid-19 Virus
13	Almajali et al., 2022	Go Cashless! Mobile Payment Apps Acceptance In Developing Countries: The Jordanian Context Perspective
14	Kurshan & Shen, 2020	Graph Computing For Financial Crime And Fraud Detection: Trends, Challenges And Outlook

15	Musyaffi et al., 2021b	Digital Payment During Pandemic: An Extension Of The Unified Model Of QR Code
16	Q. Li & Liu, 2023	Impact Of Digital Financial Inclusion On Residents' Income And Income Structure
17	Musyaffi et al., 2022	Resistance Of Traditional SMEs In Using Digital Payments: Development Of Innovation Resistance Theory
18	Baker, 2021	Everyday Experiences Of Digital Financial Inclusion In India's 'Micro-Entrepreneur' Paratransit Services
19	Purba et al., 2021	Collaboration Of Digital Payment Usage Decision In Covid-19 Pandemic Situation: Evidence From Indonesia
20	Niankara & Traoret, 2023	The Digital Payment-Financial Inclusion Nexus And Payment System Innovation Within The Global Open Economy During The Covid-19 Pandemic
21	J. Liu et al., 2023	Impacts Of Digital Financial Inclusion On Urban–Rural Income Disparity: A Comparative Research Of The Eastern And Western Regions In China
22	Kampen Kristensen & Solvoll, 2019	Digital Payments For A Digital Generation: Disruptive Technology In Book And Local Newspaper Industries
23	Patnaik et al., 2023	Exploring User Acceptance Of Digital Payments In India: An Empirical Study Using An Extended Technology Acceptance Model In The Fintech Landscape
24	Greiffenhagen et al., 2023	The Visibility Of Digital Money: A Video Study Of Mobile Payments Using WeChat Pay
25	Danchev et al., 2020	Penetration Of Digital Payments In Greece After Capital Controls: Determinants And Impact On VAT Revenues
26	Hamsin et al., 2023	Sharia E-Wallet: The Issue Of Sharia Compliance And Data Protection
27	Bhatia-Kalluri & Caraway, 2023	Transformation Of The Digital Payment Ecosystem In India: A Case Study Of Paytm
28	Miglioni, 2022	Digital Payments System And Market Disruption
29	Antonić et al., 2024	Financial Inclusion: A Driving Force For Women's Entrepreneurship Development
30	Gupta et al., 2023	Embedding Technology Interface And Digital Payment Drivers In The UTAUT2 Model: Transforming Behavioral Intention To Sustained Intention
31	Kang & Ramizo, 2022	Nexus Of Technology Adoption, E-Commerce, And Global Value Chains: The Case Of Asia
32	Yadav et al., 2024	Financial Equality Through Technology: Do Perceived Risks Deter Indian Women From Sustained Use Of Mobile Payment Services?
33	Posada, 2024	Deeply Embedded Wages: Navigating Digital Payments In Data Work
34	Sam et al., 2023	Digital Payments On The Agenda: How Supply-Side Actors Framed Cash And Digital Payments During The Covid-19 Pandemic In India
35	Wiwoho et al., 2022	Financial Crime In Digital Payments
36	Loomis & Cockayne, 2025	A Feminist Approach To Fintech: Exploring 'Buy Now, Pay Later' Technologies And Consumer Fintech
37	Baxi et al., 2023	Consumers' Digital Wallet Adoption: Integration Of Technology Task Fit And UTAUT
38	Sugu & Hussain, 2021	Bibliometric Analysis Of Published Literature On E-Wallet
39	Sadik & Rahman, 2024	Factors Affecting Digital Financial Service Adoption In Bangladesh: Evidence From SEM-ANN Approaches
40	Ortiz, 2024	Digital Payments In China: Some Questions For A Pragmatist Anthropology Of Money
41	Usman et al., 2024	Factors Affecting The Intention To Use QRIS On MSME Customers
42	Sugarda & Wicaksono, 2023	Enhancing The Competitiveness Of Indonesia's Financial Services Sector In The Digital Era Through Open Banking
43	Yuan et al., 2023	Toward The Digital Economy: Mobile Payment Affecting Sustainable Consumption Behavior
44	Indrawati, 2022	Central Bank Digital Currency Under The State Theory Of Money: A Preliminary Legal Analysis
45	Rahman & Sadik, 2025	Nexus Of Digital Financial Service Adoption, Decent Work And Environmental Sustainability

46	Wathahong et al., 2025	Assessing Disruptive Potential Of Retail Central Bank Digital Currency In Thailand
47	Mützel & Unternährer, 2024	Digital Payments And Relational Embedding
48	Dimitrova, 2024	Barrier-Breakers' Influence On Full-Adoption Of Digital Payment Methods
49	Parashar et al., 2023	Factors Influencing The Usage Of Mobile Payment Services During The Covid-19 Pandemic
50	Chavan & Kamra, 2022	Financial Inclusion In Rural India
51	Bin Mohd. Noh & Fidhayanti, 2022	Riba And Gharar On Digital Payment Applications
52	Kantaroeva & Toktomamatova, 2020	Payment Innovations In The Kyrgyz Republic
53	Kandpal et al., 2019	Post-Demonetization Impact Of Limited-Cash Retailing In Uttarakhand, India
54	Kunal et al., 2025	Enhancing Livelihoods Through Digital Finance
55	Auntie, 2025	Bitcoin, Central Bank Digital Currency And The Loss Of Money Value(s)
56	Ding et al., 2025	Rural Residents' Digital Payment And Credit Availability
57	Chilukuri et al., 2025	Sustainable Growth Toward A Cashless Ecosystem
58	Riani & Akbar, 2024	Mapping Central Bank Digital Currency Literature
59	Alkhaffaf et al., 2024	Electronic Payment Acceptance Model In UAE
60	Nasution et al., 2024	The Digital Payment System And Poverty In Indonesia
61	Torres Ortega et al., 2024	Impact Of Digital Payment Infrastructure Accessibility On Microenterprises
62	Nigam et al., 2024	Consumer Perceptions And Attitudes Toward E-Payment Services
63	Sang, 2024	Adoption Of Apple Pay Among Generation Z In Vietnam
64	Mustafa, 2024	Evaluating Digital Payment Systems And Bank Z-Score
65	Bugár & Somogyvári, 2025	Principles To Design An Ethical Payment System
66	Underdown & Tamara, 2025	Digital Wallets And Impulsive Consumer Behavior
67	Yan et al., 2025	Decency In The Digital Era And Transit Riding Preferences
68	Pizzan-Tomanguillo et al., 2024	Evolution And Trends In Digital Wallet Research
69	Divi et al., 2024	Digital Transactions And AI Regulatory Issues
70	Kala'Lembang et al., 2024	Adoption Of Digital Payment In Indonesian SMEs
71	Miftari et al., 2024	Does Fintech Affect Financial Inclusion In Balkan Countries?
72	Cong et al., 2024	Impacts Of Safety And Security On E-Wallet Intention
73	Lakew et al., 2024	Digital Payment Solutions And Gambling Behavior
74	Kuriakose & Sajoy, 2023	Strategies And Challenges Of Unified Payment Interface In India
75	Hadi Raharjo, 2023	The Gen Z's Digital Payment Loyalty In Indonesia

Based on Table 2, the research findings can be mapped into three major dimensions, namely (1) adoption factors and consumer behavior, (2) regulatory, infrastructure and financial inclusion challenges, and (3) strategies for strengthening the digital payment ecosystem.

1. Adoption Factors and Consumer Behavior

Most publications emphasize the importance of psychological and behavioral factors in influencing the adoption of digital payment services. Studies in India, Indonesia, and Vietnam (Kala'Lembang et al., 2024; Patil et al., 2020; Sang, 2024; Usman et al., 2024) show that *perceived security*, *perceived ease of use*, trust, and interface design are key determinants of continued QRIS and e-wallet use. Furthermore, personal innovation, digital anxiety, Generation Z loyalty, and risk perception also shape consumer behavior patterns (Hadi Raharjo, 2023; Miftari et al., 2024; Zhong & Moon, 2022). However, some publications have found resistance from traditional MSMEs (Musyaffi et al., 2022; Nigam et al., 2024), influenced by limited digital literacy, a preference for cash, and concerns about transaction costs.

2. Regulatory, Infrastructure, and Financial Inclusion Challenges

Limited technological infrastructure and service accessibility are major barriers to the expansion of digital payments in rural areas (Ding et al., 2025; G. Liu & Wang, 2023; Nasution et al., 2024). Research in India and China confirms the existence of a digital divide between urban and rural areas, which has implications for disparities in financial inclusion (Kang & Ramizo, 2022; M. Liu et al., 2023).

From a regulatory perspective, issues of data security, financial crime, and legal and sharia compliance arise (Bin Mohd. Noh & Fidhayanti, 2022; Hamsin et al., 2023; Kurshan & Shen, 2020; Wiwoho et al., 2022). Meanwhile, the development of Central Bank Digital Currency (CBDC) is seen as a solution to promote interoperability of cross-border payment systems, but it also presents design, ethical, and regulatory challenges (Bugár & Somogyvári, 2025; Indrawati, 2022; Wathahong et al., 2025).

3. Strategy for Strengthening the Digital Payment Ecosystem

Many studies recommend collaborative strategies between governments, regulators, financial institutions, and fintech providers to accelerate the adoption of digital payment systems (Danladi et al., 2023; Purba et al., 2021; Sugarda & Wicaksono, 2023). India's *Unified Payment Interface* (UPI) model (Kuriakose & Sajoy, 2023) is often used as an international benchmark for its success in creating an interoperable, cost-efficient, and inclusive system. In Indonesia, the implementation of QRIS is positioned as a national strategy to expand the digitization of MSME transactions (Nasution et al., 2024; Usman et al., 2024). Other studies also confirm that payment digitization can have a positive impact on economic growth, reducing corruption, empowering women, and achieving the SDGs (Antonićević et al., 2022; Setor et al., 2021; Torres Ortega et al., 2024).

RQ2 Key Research Topics and Trends related to ETPD, QRIS, and Real-Time Payment Constraints & Strategies?

1. Adoption barriers users
 - a. Low digital literacy (Musyaffi et al., 2022; Nigam et al., 2024);
 - b. Concerns data (Siagian et al., 2022; Wiwoho et al., 2022) security & privacy
 - c. Resistance to cash culture (Danchev et al., 2020; Musyaffi et al., 2022)
2. The gap infrastructure & access
 - a. Urban–rural gap in adoption (Ding et al., 2025; G. Liu & Wang, 2023)
 - b. Limited internet & smartphone access in rural areas (Nasution et al., 2024)
3. Aspect regulation & governance
 - a. Weakness regulations security cyber & protection consumer (Kurshan & Shen, 2020)
 - b. Sharia & legal compliance (Bin Mohd. Noh & Fidhayanti, 2022; Hamsin et al., 2023)
4. Research strategy trends
 - a. Collaboration cross sector between regulators, banks, fintech, MSMEs (Danladi et al., 2023; Purba et al., 2021)
 - b. Benchmarking UPI India & QRIS Indonesia as an interoperability model (Kuriakose & Sajoy, 2023; Usman et al., 2024)
 - c. CBDC & Open Banking as solution long- (Indrawati, 2022; Sugarda & Wicaksono, 2023; Wathahong et al., 2025) term

Success & Failure Factors Expansion System Digital Payments

Success factors Expansion System Digital Payments are :

1. *Trust & Security*
Consumer more believe If There is guarantee security & data (Siagian et al., 2022; Yuan et al., 2023) protection
2. *Interoperability system*
Like UPI India & QRIS Indonesia which can used cross merchant & bank (Kuriakose & Sajoy, 2023; Usman et al., 2024)
3. *Collaboration & support policy government*
Subsidy cost transactions , inclusion programs finance , education (Danladi et al., 2023; Setor et al., 2021)
4. *Adequate digital infrastructure*
Internet access, cheap smartphones , support cloud & AI (Divi et al., 2024; Nasution et al., 2024) technology

Failure factors Expansion System Digital Payments are :

1. *Literacy low digital finance*
Users reluctant switch from cash (Musyaffi et al., 2022)
2. *Cost transaction tall*
Become obstacle for MSMEs & the community earning low (Danchev et al., 2020)
3. *Fraud & crime cyber*
Reduce trust public (Kurshan & Shen, 2020; Wiwoho et al., 2022)
4. *Digital divide*
Difference penetration between urban & rural (Ding et al., 2025; G. Liu & Wang, 2023)

RQ 4 Strategy For Overcoming Obstacles & Speeding Up Adopt ETPD, QRIS, Real-Time Payment

Proposed strategy in literature For Overcoming Obstacles & Speeding Up Adoption of ETPD, QRIS, *Real-Time Payment* :

1. *Strengthening regulation and governance*
 - a. Regulation data security and protection consumer (Kurshan & Shen, 2020)
 - b. Standardization and interoperability system payment (Kuriakose & Sajoy, 2023)
2. *Innovation technology and digital inclusion*

- a. AI integration for fraud detection (Kurshan & Shen, 2020)
- b. Implementation of CBDC for push transparency and efficiency (Indrawati, 2022; Wathahong et al., 2025)
3. Improvement digital literacy and education
 - a. Educational program finance for MSMEs and rural (Musyaffi et al., 2022; Nasution et al., 2024) communities
4. Campaign awareness public related safety and benefits *cashless*,
5. Multi- party collaboration
 - a. Government, central bank, fintech, and sector private in expand merchant (Danladi et al., 2023) network
6. Case study of UPI India & QRIS Indonesia shows the success of this strategy,
7. Incentives & support financial
8. Subsidy cost transaction for MSMEs.
9. Incentive scheme for merchants & consumers new.

5. Conclusion and Suggestion

Conclusion

Study This confirm that digitalization system payment through ETPD, QRIS, and *real-time payments* have potential strategic in increase efficiency transactions, transparency of governance finance, as well as expansion inclusion finance at the level national both regionally and internationally. However Thus, its implementation Still face a number of constraint main, including limitations digital infrastructure, low literacy finance, preferences public to transaction cash, issue security and privacy, as well as regulations that have not been fully adaptive. Success factors adoption determined by trust and security system, availability equitable infrastructure, collaboration cross stakeholders interests, as well as support policy government. The strategy being assessed effective covers strengthening regulation, interoperability system, innovation technology, improvement digital literacy, and incentives economy.

Implications

In a way academic, research This enrich literature about transformation system digital payments through Systematic Literature Review and bibliometric approaches. In general practical, results study can made into reference for regulators, government regions and institutions finance in formulate policy acceleration digitalization transactions. In socio-economically, digital payments have implications for increasing literacy finance, empowerment of MSMEs, and reduction informal economy. From the perspective of technology, integration intelligence artificial and computational cloud potential strengthen security, efficiency, and range digital services.

Suggestion

First, the government need speed up development digital infrastructure in rural areas. Second, literacy programs financial and digital literacy must expanded through multi- party collaboration. Third, regulation need strengthened For ensure data security, protection consumers, and compliance law. Fourth, synergy between government, central bank, institutions finance, fintech, and telecommunications operators need enhanced to create ecosystem inclusive and sustainable digital payments.

Recommendation

Governments and regulators are advised follow the example practice best international, such as *the Unified Payment Interface* (UPI) model in India, to strengthen interoperability and efficiency system in Indonesia. Financial institutions and fintech need to designing simple, safe and suitable products need local

. Academic recommended continue study about relatedness digital payments with a development agenda sustainable. Meanwhile that, the perpetrator businesses, especially MSMEs, are recommended for integrating QRIS as an improvement strategy Power competitiveness and market expansion in the digital economy era.

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