The Role of Digital Payment Technology in Improving Retail Operational Efficiency: A Review

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ABSTRACT

Digital payment technology, including e-wallets, QR codes, and mobile banking, has become a crucial element in transforming the retail sector, particularly in simplifying transactions, reducing operational costs, and accelerating service processes. This study aims to analyze the role of digital payment technology in enhancing the operational efficiency of retail businesses. The research method used is a Systematic Literature Review (SLR) by exploring previous studies related to the perspectives of retail business owners who have adopted digital payments, as well as the challenges faced in its implementation. The research results indicate that out of 380 datasets collected, a screening and selection process was conducted based on specific criteria, yielding 15 relevant papers. The findings reveal that digital payment technology plays a significant role in improving efficiency by reducing transaction times, enhancing data management, and optimizing human resources. However, challenges such as infrastructure limitations, data security issues, and digital literacy among business owners remain obstacles that need to be addressed.

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ABSTRAK

Teknologi pembayaran digital, termasuk dompet digital (e-wallet), kode QR, dan perbankan mobile, telah menjadi elemen krusial dalam transformasi sektor ritel, khususnya dalam menyederhanakan transaksi, mengurangi biaya operasional, serta mempercepat proses layanan. Penelitian ini bertujuan untuk menganalisis peran teknologi pembayaran digital dalam meningkatkan efisiensi operasional bisnis ritel. Metode penelitian yang digunakan adalah Systematic Literature Review (SLR) dengan menelusuri studi-studi sebelumnya yang berkaitan dengan perspektif para pelaku bisnis ritel yang telah mengadopsi pembayaran digital, serta tantangan yang dihadapi dalam implementasinya. Hasil penelitian menunjukkan bahwa dari 380 dataset yang dikumpulkan, dilakukan proses penyaringan dan seleksi berdasarkan kriteria tertentu hingga diperoleh 15 artikel yang relevan. Temuan penelitian mengungkapkan bahwa teknologi pembayaran digital memainkan peran penting dalam meningkatkan efisiensi dengan cara mengurangi waktu transaksi, memperbaiki pengelolaan data, dan mengoptimalkan sumber daya manusia. Namun demikian, tantangan seperti keterbatasan infrastruktur, isu keamanan data, serta literasi digital di kalangan pemilik usaha masih menjadi hambatan yang perlu diatasi

INTRODUCTION

In recent years, consumer spending patterns have undergone a significant transformation, with digital payments becoming an essential part of daily transactions. [1]. As of October 2024, the number of QRIS users in Indonesia reached 54.1 million, with QRIS transaction values growing by 183.9% year-on-year (YoY). Additionally, the total value of digital banking transactions reached IDR 15,881.53 trillion, marking a 16.15% increase compared to the previous year. BI-RTGS transactions rose by 18.65% (YoY) to IDR 13,112.22 trillion, while BI-FAST transactions grew by 56.70% (YoY), reaching IDR 612.90 trillion [2]. These figures highlight the rapid growth of cashless payments through e-wallets, QR payments, and digital banking platforms. The rise of digital transactions in Indonesia is driven by convenience, security, and government policies promoting

cashless transactions. [3]. While digital payment adoption offers numerous advantages, retail businesses—especially micro, small, and medium enterprises (MSMEs)—still face challenges in implementation. [4]. Digital payment technology plays a crucial role in financial inclusion by providing access to financial services for previously unbanked populations. The Indonesian government actively supports digital transformation, including payment systems, through various policies aimed at fostering more efficient and transparent cashless transactions. These initiatives benefit consumers, businesses, and the economy as a whole. [5]. This study aims to evaluate the extent to which digital payments impact retail businesses and the challenges encountered during implementation.

Many previous studies have focused on the direct benefits of digital payment technology but have not sufficiently addressed the challenges faced by businesses, particularly at the MSME level. [6]. Most research remains theoretical, primarily emphasizing consumer perceptions without directly linking findings to retail business operations. [7]. Previous studies tend to concentrate on macro-level financial inclusion impacts rather than examining how digital payment adoption affects individual small retailers or specific communities. Furthermore, these studies often adopt a consumer perspective while overlooking strategies that retailers can use to enhance security and build customer trust. [8].

Prior research on the role of digital payment technology in retail has provided valuable insights but has also revealed gaps that warrant further study. [9]. By leveraging the strengths of previous research and addressing existing limitations, this study aims to offer a more comprehensive and relevant understanding of how digital payment technology contributes to improving operational efficiency in the retail sector. [10]. The findings are expected to provide strategic recommendations for business owners and stakeholders to optimize digital payment technology adoption. [11].

This study seeks to answer key questions and test hypotheses related to the role of digital payment technology in enhancing retail operational efficiency:

1. How does digital payment technology impact retail business efficiency, particularly in terms of transaction speed, data management, and cost reduction?
2. How do consumer perceptions and behaviors change with the adoption of digital payments in the retail sector?
3. How can retailers mitigate data security challenges and build consumer trust in digital payment technology?

METHOD

The study employs the Systematic Literature Review (SLR) method to assess and identify existing research relevant to a specific topic, field, or research question. SLR follows a structured approach by systematically searching for publications, evaluating their quality, and synthesizing findings using both qualitative and quantitative methods. Based on Kitchenham's framework, the SLR process consists of three main stages: planning, implementation, and reporting. During the planning stage, researchers conduct an initial search to define research objectives and establish standardized criteria for selecting journals. This step ensures a systematic and structured approach to identifying relevant studies.

The implementation stage involves performing a literature search, selecting relevant publications, and evaluating their quality. In this study, eight quality assessment questions were applied to ensure that only high-quality journals directly related to the research topic were included. After assessing quality, the selected journals underwent extraction, synthesis, and analysis, where key sections such as abstracts and conclusions were examined to identify relevant challenges and solutions.

The final stage, reporting, involves documenting findings, analyzing journal content related to research challenges, and providing recommendations. The study concludes by summarizing key insights drawn from the reviewed literature.

Planning Phase – Researchers established specific selection standards to ensure the study remained focused on relevant research.

Implementation Phase – The selection process followed a two-step screening method:

- Initial Screening (Title and Abstract Selection): This step involved applying inclusion and exclusion criteria to filter studies that aligned with the research objectives.
- Following the initial screening, researchers performed a comprehensive review of the full text to confirm its relevance to the research questions and objectives. The final selection was made based on a quality assessment of the literature, using predefined evaluation criteria to identify the most relevant and high-quality sources.

Digital Payment Technology

Digital payment technology refers to systems or payment methods that utilize electronic devices and digital networks to conduct financial transactions. According to the Bank for International Settlements (2020), digital payments involve transaction processes that do not require physical cash but instead rely on digital infrastructure such as electronic wallets (e-wallets), QR codes, Near Field Communication (NFC), and banking applications. Bank Indonesia (2021) defines this technology as encompassing various payment methods that leverage internet networks or digital-based technologies to complete transactions. Digital payment technology aims to provide convenience, speed, and security in the payment process. It supports the modern economic ecosystem by reducing dependence on cash, increasing transaction efficiency, and offering flexibility to both consumers and businesses [12].

Digital payment technology can be categorized based on the mechanisms and tools used. Electronic wallets (e-wallets), such as GoPay, OVO, and DANA, allow users to store digital balances for both online and offline transactions. QR code payment systems enable customers to scan a code to complete transactions without the need for a physical card. Another widely used method is Near Field Communication (NFC), a contactless technology that allows payments by simply bringing a device close to a payment terminal. Additionally, mobile banking provides banking services through applications, enabling users to transfer funds and pay bills directly. [13].

Key Aspects of Digital Payment Technology

Digital payment technology can be evaluated through several key aspects. Speed refers to how quickly transactions can be completed compared to traditional payment methods. Security involves encryption systems or authentication measures that protect user data. Ease of integration assesses how well the technology aligns with existing retail operational systems, such as inventory management. Lastly, accessibility considers how user-friendly the payment system is for customers with varying levels of digital literacy. [14].

Methods of Implementing Digital Payment Technology

The implementation of digital payment technology requires several key strategies. Education and training are essential for retailers, especially small and medium-sized businesses, to understand how to use digital payment systems effectively. Collaboration with technology providers, such as digital wallet companies and banks, can help minimize implementation costs and maximize technology adoption. Additionally, customer promotions, such as offering discounts and incentives, can encourage consumers to transition to digital payments. [15].

RESULTS AND DISCUSSION

Results

A total of 380 pieces of literature were initially gathered through searches in relevant databases. The selection process followed the Systematic Literature Review (SLR) methodology, ultimately refining the number of papers to 15 for extraction, synthesis, and analysis. The databases used—Sage Journals and Google Scholar—were chosen for their relevance to the research objectives.

The selection process was carried out in multiple stages:

1. Keyword-Based Identification – Researchers applied predefined keywords across five databases, resulting in 380 initial records.
2. Title and Abstract Screening – Papers closely related to the research topic were shortlisted, reducing the number to 230.

3. Full-Text Review – A thorough examination of the full content further narrowed the selection to 58 papers.
4. Quality Assessment – The final selection was based on an evaluation using eight predefined criteria, including:
   - Clarity of research objectives
   - Presence of a literature review, background, and research context
   - Discussion of previous studies to highlight contributions
   - Relevance of conclusions to the research objectives
   - Indexing status (Scopus Q1–Q4 or Sinta 1–4)

After this rigorous quality assessment, 15 journals were selected as the final sources for in-depth analysis.The final sources can bee seen at table 1.

Table 1. Final sources

Source	Initial	Final
Sage Journals	219	5
Google Scholar	161	10
Total	380	15

Discussion

Digital Payment Adoption Transformation in the Retail Sector

The digital transformation in payment systems has fundamentally changed the operational landscape of the retail sector. According to data analysis from Bank Indonesia, the value of electronic money transactions in 2022 reached IDR 51.8 trillion, reflecting a significant increase of 41.2% compared to the previous year. This phenomenon indicates a shift in consumer and business preferences in payment methods [16]. A study conducted by [17] on SMEs in Southeast Asia revealed that the adoption of digital payments has increased operational efficiency by an average of 35% and reduced cash management costs by up to 28%. In the context of operational efficiency, implementing digital payment systems has positively impacted financial management in retail. Research by [18] on Budiman Swalayan found that integrating a management information system with digital payments increased transaction recording accuracy by up to 95% and reduced financial reconciliation time from an average of 3 hours to just 30 minutes per day. This aligns with findings by [19] stating that automation in digital payment systems contributes to a 42% reduction in human errors in financial records.

Cash management and financial reconciliation have undergone significant transformation through digital payment adoption. Integrating digital payment systems with business management platforms has enabled retailers to monitor cash flow in real-time and expedite reconciliation processes. [20]. A case study on QRIS implementation in SMEs showed a 30% increase in transaction volume, with reconciliation accuracy reaching 99.8% [21]. Digital transformation in payment systems not only changes the way transactions are conducted but also has a fundamental impact on the overall retail business operations. According to [22] Implementing a Retail Management System (RMS) integrated with digital payments has enabled more efficient retail business operations, from inventory management to financial reporting. This is reinforced by [21] A case study on Budiman Swalayan showed that implementing an integrated Management Information System (MIS) not only improved transaction recording accuracy but also facilitated faster, data-driven decision-making.

Regarding operational efficiency, digital payment adoption offers multiple benefits for retailers. [23] Identified that integrated IT infrastructure allows retailers to manage and monitor sales both offline and online through a single channel, thereby enhancing consumer service efficiency. Furthermore, [24] Emphasized that digital transformation in retail payments has changed the way businesses interact with customers, where payment system integration with customer loyalty programs creates a more personalized and efficient shopping experience [25].

Recent trends and innovations in the financial sector are reshaping how institutions operate, particularly through the adoption of artificial intelligence (AI), machine learning (ML), central bank

digital currencies (CBDCs), and decentralized finance (DeFi). AI and ML are being widely used for fraud detection, leveraging real-time data analysis, behavioral analytics, and adaptive models to identify suspicious activities more accurately and efficiently [16]. These technologies enhance security, reduce false positives, and ensure compliance with regulatory standards. Meanwhile, CBDCs are emerging as a new form of sovereign digital money, offering benefits such as financial inclusion, faster payments, and more efficient monetary policy tools [25]. However, they also raise concerns about privacy, cybersecurity, and the potential impact on traditional banking systems. In parallel, DeFi and smart contracts are enabling a decentralized alternative to conventional financial services by automating transactions, removing intermediaries, and offering open, transparent systems [32]. While these technologies promise greater efficiency and accessibility, they also pose regulatory and security challenges that must be carefully addressed to ensure long-term sustainability and public trust [34].

Infrastructure and Technological Readiness

An evaluation of the supporting infrastructure for digital payments shows significant progress but still faces several challenges. According to research by [26] Indonesia's technology infrastructure has grown positively, with internet penetration reaching 73.7% of the total population. However, infrastructure disparities between urban and rural areas remain a major obstacle to equitable digital payment adoption. Data from the Indonesian Retail Entrepreneurs Association (APRINDO) reveals that 64% of SMEs still face implementation challenges, particularly regarding infrastructure and digital literacy. An analysis of human resource readiness in implementing digital payment technology highlights gaps that need to be addressed. [27]. A longitudinal study by [28] Involving 500 SME operators in Indonesia found that only 45% of employees have a comprehensive understanding of digital payment systems. Training and mentoring programs conducted by various institutions have yielded positive results, with a 28% increase in technology adoption rates following program implementation. [29].

The identification of technical barriers and adaptation solutions suggests the need for an integrated approach. Research by [28] Identified three main obstacles in digital payment implementation: infrastructure limitations (38%), low digital literacy (31%), and security concerns (23%). Proposed adaptation solutions include developing cloud-based infrastructure, implementing human resource capacity-building programs, and enforcing multi-layered security systems. Technology infrastructure plays a crucial role in supporting the digital transformation of the retail sector, particularly in implementing digital payment systems. An effective Retail Management System (RMS) requires integrating various technological components, from inventory management to the Point of Sale (POS) system. [30]. This aligns with [31] Findings, identify integrated IT infrastructure as one of the key components in retail industry adaptation in the digital era. Security aspects of infrastructure are a major concern in digital payment implementation. The importance of implementing security solutions like Zero Trust Cloudflare to protect data transmission between stores and retail expansion into e-commerce [31]. This is reinforced by [32] Who identified data security as a key challenge in retail technology adoption, where poor security could threaten customer trust and company reputation.

To address infrastructure and technological readiness challenges, [33] Recommends a comprehensive approach, including proper IT infrastructure planning, robust security system implementation, and continuous training programs. [34] Adds that focusing on innovation and employee training is a key strategy for the successful implementation of technology in retail businesses.

Consumer Behavior Changes and Operational Impact

An analysis of consumer payment method preferences indicates a significant shift towards digital. According to a study by [35], 72% of Indonesian consumers prefer using digital payments over conventional methods. The main factors influencing this preference include ease of use (42%), transaction security (35%), and offered incentives (23%). APRINDO data shows an 83.8% increase in digital transactions in the retail sector in 2022. The impact on service speed and customer satisfaction shows a positive correlation with digital payment implementation. A study by [36]

Revealed that average transaction time decreased from 3 minutes to 45 seconds using digital payments. Customer satisfaction levels also increased by 67% after implementing an integrated digital payment system. Digital transformation has fundamentally changed how consumers interact with retail businesses, especially in terms of payment preferences. [37] Highlights that adopting a Retail Management System (RMS) integrated with digital payment systems has enabled retail stores to provide more personalized and efficient services to customers. This aligns with [38] Findings show that using technology in retail businesses has changed how companies interact with customers, creating a smoother and more satisfying shopping experience.

Consumer behavior changes have also impacted retail operational strategies. [31] Revealed that integrated IT infrastructure allows retailers to serve consumers more effectively without taking up much time. [28] Emphasized the importance of adopting technology to create a seamless shopping experience, including through mobile applications and digital payments. Security in digital payments is also a major concern for consumers. [28] Underscores the importance of customer data security as a key factor in building trust. [31] Adds that implementing security solutions such as Zero Trust Cloudflare is crucial to protecting transactions and customer data.

Security Aspects and Risk Mitigation

The evaluation of digital transaction security systems indicates increasing threat complexity as digital payment adoption rises. According to the Cybersecurity Research Group (2024), the retail sector experienced a 47% increase in cybersecurity incidents compared to the previous year. The implementation of the Zero Trust Security Framework, as applied through Cloudflare, has proven to reduce data breach risks by up to 82% in retail digital payment systems. [28].The analysis of security incidents and mitigation can bee seen at table 2.

Table 2. Analysis of Security Incidents and Mitigation

Incident Type	Incident Percentage	Mitigation Method	Effectiveness Level
Phishing	35%	Multi-Factor Authentication	92%
Malware	28%	Advanced Threat Protection	88%
Data Breach	22%	End-to-End Encryption	95%
Account Takeover	15%	Behavioral Analytics	85%

An analysis of digital payment adoption's impact on financial service access shows a significant increase in financial inclusion. A longitudinal study by the Asian Development Bank (2024) found that digital payment implementation has increased access to formal financial services for SMEs by 56% over the past two years. The Bank Indonesia QRIS program has contributed to a 72% increase in digital financial service penetration among SMEs. The impact of digital payment can bee seen at table 3.

Table 3. Impact of Digital Payment Adoption on MSME Performance

Performance Indicator	Before Adoption	After Adoption	Percentage Change
Monthly Revenue	Rp 15,000,000	Rp 21,750,000	45%
Operational Costs	Rp 3,000,000	Rp 1,950,000	-35%
Reconciliation Time	180 minutes	30 minutes	-83%
Error Rate	15%	2%	-87%

Recommendations and Development Strategies

Synthesis of research findings yields several practical implications for developing digital payment systems in the retail sector. [39] Identified three priority areas: technological infrastructure enhancement, human resource capacity development, and security system strengthening. The implementation of cloud-based strategies has proven effective in addressing these issues. Ultimately, the successful adoption of digital payment technology in the retail sector relies on a holistic approach that considers infrastructure readiness, security aspects, and human resource development to optimize the benefits of digital payment technology for the retail industry.

CONCLUSION

Digital payment technology enhances retail operational efficiency and transforms consumer behavior, emphasizing convenience, speed, and security in transactions. However, its implementation presents operational challenges and risks that must be mitigated, particularly data security threats and potential cyberattacks. To address these issues, retailers need to invest in encryption technology, dual authentication systems, and employee training on digital security. Additionally, reliance on technological infrastructure, such as internet connectivity, can lead to operational disruptions if technical issues arise. Therefore, risk mitigation through backup systems, regular maintenance, and collaboration with trusted technology providers is essential. Apart from efficiency, security in digital payment systems plays a crucial role in maintaining customer trust and business reputation. Implementing technologies like Zero Trust Cloudflare enhances data protection while integrating digital payments with loyalty programs improves the shopping experience. Overall, digital payment adoption not only streamlines transactions but also reshapes retail business operations, ensuring competitiveness in the evolving digital landscape.

Despite the rapid evolution of digital payments, immature regulations and public resistance to new technologies remain significant barriers to widespread adoption. Regulatory frameworks in many regions struggle to keep pace with innovation, creating uncertainty for both fintech startups and traditional banks. At the same time, public skepticism—often driven by concerns about privacy, security, and unfamiliarity with new systems—hampers user adoption. To overcome these challenges, a strategic collaboration between banks and fintech companies is recommended. Such partnerships can combine the regulatory expertise and customer trust held by banks with the agility and innovation of fintechs. Looking ahead, the future of digital payments will likely be shaped by integrated ecosystems that offer seamless, secure, and inclusive financial services—driven by regulatory clarity, technological innovation, and increased public trust.

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