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The Role of Digital Literacy of Electronic Transactions in Optimizing Regional Income in Probolinggo City

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Abstract:

The increasing adoption of digital payment systems has created opportunities for local governments to improve the efficiency, transparency, and accountability of regional revenue management. However, the effectiveness of electronic transactions depends not only on technological infrastructure but also on the digital literacy of the community. This study examines the role of digital literacy in electronic transactions and its contribution to optimizing regional revenue in Probolinggo City. Using a qualitative descriptive approach, data were collected through interviews, observation, and documentation involving government officials, employees, and public users, supported by relevant official documents and literature. The findings indicate that digital literacy contributes to regional revenue optimization through improved technical skills, information literacy, digital security awareness, and responsible use of electronic payment systems. The implementation of e-SPTPD and QRIS also provides opportunities to increase payment convenience and strengthen transparency in regional revenue administration. However, challenges remain, including unequal digital skills and access, continued preference for cash payments, limited familiarity with digital payment systems, and security concerns. Therefore, strengthening digital literacy alongside accessible, secure, and user-friendly digital payment infrastructure is essential for sustainable regional revenue optimization.

Keywords:

Clean Governance; Digital Literacy; Electronic Transactions; Optimizing Regional Revenue; Regional Digitalization.

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1. Introduction

The rapid development of information and communication technology has brought significant changes in various aspects of life, including governmental and regional economic sectors. The digitalization of transactions, such as electronic payment of taxes and levies, has become an innovative form capable of improving the efficiency of public services and financial transparency (Saragih et al., 2023). The Probolinggo City Government, as one of the regions undergoing transformation toward a smart city, must optimize the use of digital technology in regional revenue management to ensure processes are effective, accountable, and accessible to the public.

The mandate for regional digitalization contained in Presidential Regulation Number 95 of 2018 concerning the Electronic-Based Government System (*Sistem Pemerintahan Berbasis Elektronik*/SPBE) emphasizes the realization of quality public services and clean, effective, transparent, and accountable governance through electronic-based systems. In line with the government's priority in strengthening financial governance, supporting the national economy, and promoting non-cash payments, SPBE requires strategic efforts to accelerate its implementation, including strengthening digital literacy in electronic transactions (Anas & Cahyawati, 2023). Presidential Decree Number 3 of 2021 concerning the Task Force for the Acceleration and Expansion of Regional Digitalization aims to accelerate and expand regional digitalization, particularly through the Electronification of Regional Government Transactions (ETPD). This policy is designed to enhance financial transparency, strengthen governance, and integrate regional financial management systems to optimize regional income. Government Regulation Number 12 of 2019 concerning Regional Financial Management also mandates electronic-based financial management systems.

Digital literacy is an important asset in supporting community participation in digital-based public services. It refers not only to the technical ability to operate digital devices but also to understanding, evaluating, and using digital technology effectively and responsibly, including ethics, security, and critical thinking (Indah et al., 2022). In electronic financial transactions, digital literacy includes the ability to use digital technology for money transfers, online shopping, bill payments, and other financial activities. Electronic transactions have also become an important instrument for increasing transparency, accountability, and minimizing regional revenue leakage (Fratila et al., 2023). Their digitalization can improve efficiency in terms of time and cost while enabling real-time monitoring of tax and levy payments (Danu et al., 2023).

Regional Original Income (PAD) is an important source of regional development financing derived from local taxes, levies, regional wealth management, and other legitimate income, as stipulated in Law No. 1 of 2022. Optimizing PAD requires innovation in management and collection systems, including digital technology, which can expand the tax base, reduce potential revenue leakage, and improve the accuracy of regional financial data (Hendrawati, 2021). The effectiveness of electronic transaction systems is strengthened when supported by communities with adequate digital literacy. Communities with better understanding of digital transactions tend to participate more actively in digital public services, including tax and levy payments, thereby supporting compliance and regional revenue optimization (Mandasari, 2024).

However, the implementation of digital transactions still faces challenges related to public understanding, security, accessibility, and willingness to adopt digital payment systems. In Probolinggo City, some residents remain hesitant to shift from conventional systems because of limited awareness of the benefits, safety, and convenience of electronic transactions (Ibrahim et al., 2024). Therefore,

strengthening digital literacy is important to support effective electronic transaction implementation and the development of transparent, efficient, and accountable regional financial governance.

Based on this background, this study aims to examine the role of community digital literacy in supporting electronic transactions and optimizing regional revenue. Accordingly, the study addresses the following research questions:

RQ1: How does community digital literacy influence the implementation of electronic transactions in optimizing regional revenue?

RQ2: What are the opportunities and challenges of digital literacy in supporting electronic transactions and regional revenue optimization?

2. Methods

This study uses a qualitative approach with a descriptive method, chosen to understand in depth how community digital literacy plays a role in supporting the implementation of electronic transactions to optimize regional income in Probolinggo City. The qualitative descriptive research approach allows the researcher to describe social phenomena based on facts that occur in the field through deep interpretation of the data obtained (John & Creswell, 2017). The study was conducted in Probolinggo City, East Java, focusing on several agencies related to regional income management, such as the Regional Revenue, Financial, and Asset Management Agency (*Badan Pendapatan, Pengelolaan Keuangan dan Aset Daerah/* BPPKAD), as well as public users of electronic transaction services. The research took place over three months, covering the preparation, data collection, and data analysis stages, and was carried out between July and September 2025.

The data used in this study consist of both primary and secondary sources. Primary data were obtained through in-depth interviews with BPPKAD employees, government officials involved in transaction digitalization, and members of the public who use electronic tax and levy payment services. Secondary data were gathered from official local government documents, financial reports, publications from the Central Bureau of Statistics (*Badan Pusat Statistik*/BPS), and relevant scientific literature related to digital literacy and the optimization of regional income. Data collection techniques included observation, interviews, and documentation studies to ensure that the data obtained were comprehensive and valid.

Data analysis was conducted using the interactive model of Miles (1994) which includes three main stages. The first stage is data reduction, where the researcher selects and focuses on data relevant to the role of digital literacy in electronic transactions. The second stage is data presentation, where interview and observation results are organized in narrative or tabular form to facilitate interpretation. The final stage is conclusion drawing and verification, where the researcher interprets the analyzed data to answer the research problem formulation. To ensure data validity, this study uses source and method triangulation techniques. Triangulation was carried out by comparing interview results from various informants, field observations, and supporting documents. In addition, a member-checking process was conducted by requesting confirmation from informants to ensure the accuracy of the researcher's interpretation of the data provided.

3. Results and Discussion

3.1. The Role of Digital Literacy in Electronic Transactions and Regional Revenue Optimization

The findings indicate that digital literacy plays an important role in supporting the implementation of electronic transactions and the optimization of regional revenue. Digital literacy refers to the ability to read, understand, analyze, and use

digital technology effectively in everyday activities. In the context of electronic transactions, this ability includes the use of digital technology for money transfers, online shopping, bill payments, and other financial activities. The level of community digital literacy influences the extent to which electronic transaction systems can be adopted effectively because users need sufficient knowledge and skills to operate digital platforms safely and confidently (Hyejin et al., 2021).

The findings further show that digital literacy in electronic financial transactions consists of several interconnected aspects, including technical skills, digital security, digital ethics, and information literacy. Technical skills involve the ability to operate computers, smartphones, tablets, payment applications, e-wallets, and other digital financial services (Khando et al., 2022). These competencies are necessary because electronic transactions require users to understand basic digital technology and be able to access and operate the platforms provided by financial institutions and government agencies. In addition, users need to be able to search, compare, and evaluate information before conducting transactions and select secure and trusted digital platforms.

Digital security is also an important component of digital literacy. Although electronic transaction systems provide convenience and efficiency, users remain exposed to risks such as phishing, identity theft, and online scams. Therefore, digital literacy requires users to understand how to protect personal data, use secure passwords, avoid suspicious links or emails, and recognize potential fraud. The findings demonstrate that adequate digital literacy allows users to conduct electronic transactions more safely while reducing the risks associated with inappropriate use of digital technology. This aspect is particularly important because electronic transactions involve financial information and personal data that require responsible management.

Digital ethics and information literacy complement these technical and security competencies. Users need to understand the legal and ethical consequences of their activities in digital environments, including privacy violations, data misuse, fraud, and other irresponsible behavior (Prakarsh et al., 2024). At the same time, information literacy enables users to assess the accuracy and reliability of transaction-related information and recognize misleading or false information. These capabilities support informed decision-making and reduce the possibility of users becoming victims of fraud or other digital risks.

The findings also demonstrate that digital literacy has a direct connection with the effectiveness of electronic transactions in regional financial management. Electronic transactions provide an important mechanism for increasing transparency and accountability while reducing the potential for leakage of regional revenue (Fratila et al., 2023). Digital transaction systems also enable payment activities to be monitored more effectively and provide opportunities for more efficient financial administration. The implementation of digital systems can reduce the time and cost required for financial transactions while enabling real-time tracking of regional tax and levy payments (Danu et al., 2023). Consequently, digital literacy becomes an important supporting factor because the benefits of electronic transaction systems can only be fully realized when the community is able and willing to use them.

This relationship is particularly relevant to Regional Original Income (PAD), which constitutes an important source of regional development financing derived from local taxes, levies, regional wealth management, and other legitimate income. The optimization of PAD requires innovation in regional revenue management and collection systems. The use of electronic transaction systems can expand the tax base, reduce potential revenue leakage, and improve the accuracy of regional financial data (Hendrawati, 2021). However, the effectiveness of these systems

depends not only on the availability of technological infrastructure but also on the ability of the community to utilize the technology.

Digital literacy therefore functions as a connecting factor between the electronic transaction system provided by the government and community participation in regional financial activities. Communities that understand the operation and benefits of digital transactions are more likely to use electronic services for tax and levy payments. Improved understanding can also strengthen compliance and participation in digital payment systems (Mandasari, 2024). In this context, digital literacy contributes to the creation of a financial ecosystem that is more efficient, transparent, accountable, and responsive.

The findings further indicate that digital literacy supports the transformation from manual to digital financial processes. Increased use of digital technology can improve the accuracy, efficiency, transparency, and accountability of regional financial governance. Digital literacy is therefore not merely a technical competency but also an important element of effective digital governance. Individuals with adequate digital competencies are better positioned to use electronic payment services, evaluate transaction information, protect their personal data, and participate responsibly in digital financial activities.

The role of digital literacy is consequently reflected in the broader implementation of Electronic Transactions of Regional Government (ETPD). The ETPD framework seeks to encourage the electronification of regional revenue and expenditure transactions and to improve the quality of payment services between government and society. In this process, digital literacy helps ensure that technological transformation is accompanied by community capability and participation. The stronger the community's ability to understand and use digital transaction systems, the greater the potential for electronic transactions to support efficient regional revenue collection and strengthen financial governance.

Thus, the findings answering RQ1 demonstrate that community digital literacy contributes to regional revenue optimization through three main mechanisms: increasing the community's ability to use electronic transaction systems, strengthening the security and reliability of digital financial activities, and encouraging greater participation in electronic tax and levy payments. Digital literacy consequently supports the effectiveness of ETPD while contributing to transparency, efficiency, accountability, and improved management of regional revenue.

3.2. Opportunities and Challenges of Digital Literacy in Supporting Electronic Transactions

The implementation of electronic transactions in Probolinggo City has developed rapidly since 2019 following the issuance of Probolinggo Mayor Regulation Number 129 of 2019 on Non-Cash Transaction Implementation and Mayor's Decree Number 100.3.3.3/88/KEP/425.012/2023 concerning the Acceleration and Expansion of Regional Digitalization Team. The implementation of electronic transactions has provided benefits not only as a response to the COVID-19 pandemic but also in strengthening accountability and transparency in regional financial management. Support from the central government through Presidential Decree Number 3 of 2021 concerning the Regional Digitalization Task Force further strengthens these efforts by promoting transparency, optimizing regional income, and improving fiscal health (Pandiangan et al., 2024). The establishment of the TP2DD by the Probolinggo City Government also aims to expand digital payment channels for revenue and expenditure transactions while increasing public acceptance of digital services.

The implementation of ETPD represents an integrated effort to shift regional financial transactions from cash to non-cash systems. This transformation provides opportunities to increase efficiency and accountability in public services while

supporting more transparent regional financial management. Digital literacy is important in this process because communities need sufficient knowledge and skills to use electronic transaction systems effectively and safely (Sari et al., 2024). In Probolinggo City, the development of the e-SPTPD system through collaboration between BPPKAD and Bank Jatim provides taxpayers with an online payment mechanism using QRIS. This system enables regional tax payments to be conducted more quickly, transparently, and measurably.

Table 1. Summary of Regional Tax and Regional Retribution Payment Methods

Year 2024	**Cash**	**Non -Cash**	**Total**
Types of Taxes & Levies	**Rp**	**Rp**	**Rp**
Hotel Tax	31,023,119.27	1,956,365,130.00	1,987,388,249.27
Restaurant Tax	735,797,541.00	9,109,140,704.30	9,844,938,245.30
Entertainment Tax	0.00	918,427,153.00	918,427,153.00
Advertising Tax	255,502,530.00	1,217,573,117.00	1,473,075,647.00
Street Lighting Tax	5,335,875.00	21,081,095,557.00	21,086,431,432.00
Parking Tax	21,512,184.00	245,399,540.00	266,911,724.00
Groundwater Tax	33,705,909.00	415,444,730.00	449,150,639.00
property tax Rural and Urban	9,190,925,815.90	3,913,891,689.10	13,104,817,505.00
Land and Building Acquisition Tax	0.00	14,088,446,730.00	14,088,446,730.00
Retribution Health services	2,741,795,047.37	5,150,787,269.63	7,892,582,317.00
Retribution Service Garbage / Cleanliness	0.00	269,753,000.00	269,753,000.00
Retribution Parking Services on Public Roads	2,618,517,500.00	1,079,290,000.00	3,697,807,500.00
Retribution Market Services	1,613,300.00	2,267,539,094.00	2,269,152,394.00
Retribution Provision and/ or Suction toilet	9,140,000.00	8,085,000.00	17,225,000.00
Retribution Usage Regional Wealth	128,238,645.00	3,985,616,989.00	4,113,855,634.00
Retribution Place Auction	0.00	71,050,000.00	71,050,000.00
Terminal Fee	0.00	35,028,000.00	35,028,000.00
Retribution Place Parking Only	0.00	125,526,000.00	125,526,000.00
Slaughterhouse Fee	0.00	62,211,200.00	62,211,200.00
Retribution Place Recreation and Sports	0.00	669,740,500.00	669,740,500.00
Retribution Sale Regional Business Production	0.00	277,816,028.00	277,816,028.00
Retribution Agreement	373,278,551.00	553,130,106.00	926,408,657.00

Building Construction				
TOTAL	Rp	16,146,386,017.54	67,501,357,537.03	83,647,743,554.57
	%	**19.3%**	**80.7%**	**100%**

The data in Table 1 demonstrate that non-cash transactions constituted the majority of regional tax and retribution payments in Probolinggo City in 2024, accounting for 80.7% of total payments, while cash transactions accounted for 19.3%. This indicates that electronic payment systems have become an important part of regional financial transactions. The dominance of non-cash payments provides an opportunity for the government to strengthen digital financial governance because electronic transactions can facilitate recording, monitoring, and evaluation of revenue collection. At the same time, the remaining 19.3% of cash payments indicates that digitalization has not yet been fully adopted by all members of the community.

The findings show that the opportunities provided by digital transactions extend beyond payment convenience. Electronic systems can improve the speed, accuracy, transparency, and accountability of regional financial transactions. Transaction records can be monitored more systematically, reducing administrative inefficiencies and supporting the government's ability to evaluate revenue collection. Increased public participation in electronic transactions can also strengthen financial inclusion and integration between the community and the regional financial system. In this regard, digital literacy becomes an important factor in ensuring that the technological opportunities created by ETPD can be utilized effectively by the community.

Nevertheless, the findings reveal several challenges in achieving inclusive adoption of electronic transactions. Not all residents possess adequate digital literacy or have access to digital financial facilities. Some residents do not have mobile banking, e-wallets, credit cards, or even bank accounts. Certain traders and taxpayers continue to prefer cash payments because they are considered more convenient or because they lack appropriate digital devices. Others remain unfamiliar with e-commerce and digital payment systems such as QRIS, while some consider electronic money inconvenient because it requires regular top-ups.

Another challenge concerns public perceptions and habits. Some citizens continue to prefer direct payments to government officers because of distance from the city center or because they require stamped receipts as proof of payment (Sari et al., 2024). These conditions demonstrate that digital transformation is not determined solely by the availability of technological infrastructure. Community willingness, knowledge, confidence, and habits also influence the effectiveness of digital transaction implementation. Therefore, increasing digital literacy must be accompanied by efforts to build public trust and make electronic transaction systems accessible and easy to use.

Digital security represents another important challenge. The increasing use of electronic transactions exposes users to risks such as phishing, identity theft, online scams, and misuse of personal information. Communities therefore require not only technical skills but also knowledge of digital security and responsible digital behavior. Digital literacy training can help users recognize fraudulent activities, protect personal data, and use reliable transaction platforms. Strengthening these competencies can increase public confidence and encourage wider adoption of electronic payment systems.

Infrastructure and accessibility also remain relevant challenges. Although the internet network in Probolinggo City has reached government units and most public areas, differences in access and digital skills continue to affect the ability of residents to participate in electronic transactions. The findings therefore indicate that

technological development needs to be accompanied by equitable access, affordable connectivity, and continuous community education. Without these supporting factors, digitalization may benefit technologically capable groups more than communities with limited access and digital competencies.

The government and private sector have responded to these challenges through efforts to expand affordable internet access, provide digital literacy training, and conduct regular counseling concerning online security and fraud prevention. The development of user-friendly and secure digital platforms is also important for increasing public trust. These efforts demonstrate that the optimization of regional revenue through electronic transactions requires collaboration between technological development and community capacity building.

Overall, the findings answering RQ2 demonstrate that digital literacy creates substantial opportunities for strengthening electronic transactions, financial inclusion, transparency, efficiency, and regional financial governance. However, these opportunities are accompanied by challenges involving limited digital skills, unequal access to financial technology, persistent preference for cash payments, security risks, and differences in public acceptance. Therefore, strengthening digital literacy through education, socialization, security awareness, and accessible digital services is essential to ensure that regional digitalization becomes more inclusive and contributes sustainably to regional revenue optimization.

4. Conclusion

Digital literacy plays an important role in supporting the implementation of electronic transactions and optimizing regional revenue. The findings show that digital literacy is not limited to the ability to operate digital devices and payment applications, but also includes information literacy, digital security awareness, and responsible digital behavior. These competencies enable communities to understand, use, and trust electronic transaction systems more effectively. In the context of regional revenue, improved digital literacy can encourage greater adoption of non-cash payments, strengthen transparency and accountability, and reduce the potential for errors and revenue leakage. The implementation of electronic transactions in Probolinggo City also demonstrates significant opportunities for regional revenue optimization. The use of electronic payment systems, including e-SPTPD and QRIS, provides greater convenience for taxpayers and retribution payers while supporting more efficient and transparent revenue administration. The predominance of non-cash transactions in the analyzed data further indicates the growing acceptance of digital payment mechanisms.

However, several challenges remain, particularly differences in digital skills, limited access to digital financial services, preferences for cash payments, unfamiliarity with digital payment systems, and concerns regarding security and convenience. Therefore, optimizing regional revenue through electronic transactions requires not only the development of digital payment infrastructure but also continuous improvement of community digital literacy. Government efforts should focus on expanding digital access, strengthening digital literacy education and training, improving public awareness of transaction security, and providing electronic payment platforms that are accessible, secure, and user-friendly. Integrating these efforts can strengthen the effectiveness of electronic transactions and contribute to more transparent, accountable, and sustainable regional revenue management.

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The data that support the findings of this study are available from the corresponding author upon reasonable request.