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Digital Transformation at the Grassroots: Unveiling Spill-over Effects and Adaptation Resistance of QRIS in Traditional Marketplace MSME Ecosystems of Palopo City

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ABSTRACT

Digital payment transformation through Quick Response Code Indonesian Standard (QRIS) has become a catalyst for fundamental change in Indonesia's Micro, Small, and Medium Enterprises (MSME) ecosystem. This research analyzes the impact of digital payment policy on MSME actors in the Pancasila Field culinary center of Palopo City using the Howlett-Mukherjee Policy Complexity framework (2014) with a five-dimensional approach: interconnectivity, spill-over effects, system resilience, implementation complexity, and stakeholder resistance. The quantitative research method with random sampling technique involved 22 MSME actors selected from a population of 90 business units using the Slovin formula (5% margin of error). The research results show that QRIS adoption creates high interconnectivity between digital payment systems and MSME operations, where 90.90% of respondents have used QRIS for 1-2 years with instrument reliability Cronbach's Alpha of 0.876. Significant spill-over effects were identified through consumer behavior changes, emergence of digitalization support businesses, and transformation of MSME business models from conventional to digital hybrid. System resilience is reflected in increased digital literacy, market access expansion, and financial transparency. However, implementation complexity still faces constraints of limited technological knowledge, unstable internet infrastructure, and Merchant Discount Rate costs of 0.7%. Stakeholder resistance shows cash transaction preferences due to local cultural habit factors, although some business actors have developed collaborative innovations with fintech platforms. This research contributes to the implementation of the Indonesian Payment System Blueprint 2030 by providing evidence-based policy recommendations for accelerating digital financial inclusion in Eastern Indonesia.

Keywords*: Digital Payment Policy, QRIS, MSME, Digital Transformation*

1. INTRODUCTION

Digital transformation in payment systems has become a catalyst for fundamental change in the global economic ecosystem, particularly for the Micro, Small, and Medium Enterprises (MSME) sector which serves as the backbone of the national economy. The financial technology (fintech) revolution not only changes how consumers transact but also opens significant opportunities for modernizing the informal economic sector that has long faced limited access to formal financial services. Research (Zhang et al., 2023) in the Asia-Pacific market identified that adoption of digital payment technology can increase MSME operational efficiency by up to 35% and expand market access by up to 50%.

In Indonesia, the Quick Response Code Indonesian Standard (QRIS) launched by Bank Indonesia on August 17, 2019, represents a strategic response to the increasingly urgent need for national economic digitalization. The implementation of QRIS (Quick Response Indonesia Standard) on MSMEs in Banten Province has provided positive impacts that support the development of small and medium enterprises. QRIS has not only successfully improved transaction efficiency through accelerated payment processes and ease of business result recording but has also significantly promoted financial inclusion by facilitating MSMEs to adopt payment systems (Pratiwi, 2022).

Research (Krah et al., 2024) shows that in developing countries, digital payment policies need to consider specific behavioral and adoption factors to achieve maximum effectiveness. Research using the Technology Acceptance Model (TAM) found that of 13 hypotheses tested, 11 proved significant with model explanatory power reaching 82.9%. The key factors most influential in driving FinTech adoption are perceived usefulness, followed by intention to use, while perceived ease of use does not have direct influence but is mediated by other factors. These findings indicate that digital payment policies in developing countries must focus on enhancing perception of technology benefits for MSMEs, building supporting infrastructure, and conducting intensive education about digital payment system operations to overcome understanding constraints and internet network limitations that remain major obstacles.

Although QRIS policy has been implemented nationally with encouraging achievements, its impact on local MSME actors still requires in-depth and comprehensive analysis. Pancasila Field in Palopo City as a rapidly developing traditional culinary marketplace faces complex challenges in adopting digital payment technology. These challenges encompass a broad spectrum, from limited digital literacy among traditional business actors to cultural resistance toward changing conventional transaction systems that have been rooted in local business practices. Research (Ly & Ly, 2024) found that public trust levels toward digital technology, diverse economic conditions between urban and rural areas, and limited access to financial services in rural areas become significant barriers in digital payment system adoption. Developing technological infrastructure, disparities in digital and financial literacy levels across demographics, and evolving regulatory environments also influence adoption rates.

The complexity of digital payment policy implementation problems requires holistic understanding that goes beyond direct impact analysis alone. In line with (Howlett & Mukherjee, 2014) who developed the Policy Complexity theoretical framework that analyzes policy phenomena through five fundamental dimensions: inter-sectoral interconnectivity, spill-over effects on non-targeted systems, system resilience in facing change, multi-level implementation complexity, and stakeholder resistance to transformation. This analytical framework provides comprehensive perspective for understanding policy implementation dynamics in complex socio-technical system contexts.

This research aims to analyze the impact of QRIS digital payment policy on MSME actors in Pancasila Field, Palopo City using the Policy Complexity theoretical framework (Howlett & Mukherjee, 2014). Specifically, this research examines five main dimensions that interact with each other: inter-sectoral interconnectivity in digital ecosystems, spill-over effects on business model transformation, MSME system resilience in facing technological change, policy implementation complexity at the grassroots level, and stakeholder resistance to new technology adoption.

Table 1. Performance data of Palopo City MSMEs until November 2024.

Subdistrict	Unit	Initial capital
Wara	3418	36,488,220,000
Wara Timur	3118	49,832,940,000
Wara Utara	1870	33,033,956,000
Wara Barat	798	7,887,840,000
Wara Selatan	1115	21,657,000,000
Telluwanua	1235	12,619,240,000
Bara	2447	39,676,670,000
Sendana	386	5,558,720,000
Mungkajang	432	6,995,320,000
Total	**14819**	**213,749,906,000**

Previous empirical studies show diverse results regarding digital payment impacts on MSME performance, reflecting the complexity of the phenomenon studied. In research (Ovami et al., 2023), ease of use of digital payment systems becomes a key factor significantly influencing usage intention. Research using the DeLone and McLean Information System Success Model found that system quality has positive and significant influence on intention to use digital payment systems (p-value 0.031 < 0.05), while service quality also has significant influence (p-value 0.000 < 0.05). These findings are reinforced by research (Wibisono et al., 2024) which proved significant influence of e-commerce, financial technology, and social media usage on MSME income increases in Central Java, with fintech contribution reaching 28.7% toward income growth.

However, empirical reality shows significant impact variations based on local context and business characteristics. Case study conducted by (Rizkiyah et al., 2021) revealed that although OVO digital payment platform provides operational convenience, impact on consumer behavior change is heavily influenced by demographic factors and digital literacy. Their research identified that the industrial revolution 4.0 creates a paradigm shift in community consumption patterns from manual to automatic, but adoption speed varies across market segments.

International perspective provides broader theoretical insights regarding fintech technology adoption phenomena in the MSME sector. Research (Lee & Jang, 2021) shows that QR code usage for digital payment systems experienced significant growth, especially after 2010 with smartphone technology development. In South Korea, QR code-based payment services were first initiated by Kakao through 'Kakao pay' in 2018, and offline QR-based payment services began when government-supported 'Zero Pay' started providing payment services in the first half of 2021. According to Juniper Research reports, approximately 1.3 billion QR codes were used in 2019 and the number is expected to reach 5.3 billion in 2022.

Meanwhile, (Astianty Putri & Rianto, n.d.) in comparative research also identified main challenges in FinTech adoption, namely limited digital literacy and technology understanding, indicating the need for education programs and support to maximize the potential offered by FinTech. Significant differences were also found between developed and developing countries, where developed countries have more mature technological infrastructure and high digital literacy levels, while developing countries have great potential for growth despite facing regulatory and technological infrastructure limitations.

This research adopts a quantitative approach with structured survey method toward 22 MSME actors selected using random sampling technique from a population of 90 business units in Pancasila Field, Palopo City. The Howlett-Mukherjee Policy Complexity analytical framework is applied to provide comprehensive understanding regarding QRIS implementation dynamics involving multiple stakeholders and multiple levels. This methodological approach enables identification not only of direct effects (direct effects) but also indirect effects (spill-over effects) that are often overlooked in conventional policy evaluation yet have significant long-term implications.

The novelty of this research lies in applying the Policy Complexity theoretical framework in the specific context of MSME digital transformation in Eastern Indonesia, a region that has received less attention in academic literature regarding digital transformation. This research contributes to literature development by providing evidence-based policy recommendations for accelerating digital financial inclusion in Indonesia's frontier regions. Research findings are expected to serve as scientific reference for implementing the Indonesian Payment System Blueprint 2030, particularly in optimizing digital payment policy impacts on developing sustainable, inclusive, and adaptive MSME ecosystems toward global digital economic dynamics.

2. METHODS

This research uses a quantitative approach with descriptive survey design to analyze the impact of QRIS digital payment policy on MSME actors in Pancasila Field, Palopo City. The quantitative approach was chosen for its ability to objectively measure complex variables related to digital policy implementation and provide reliable result generalization (Creswell & Creswell, 2018). This research design adopts a cross-sectional survey using the Howlett-Mukherjee Policy Complexity theoretical framework.

The research was conducted at Pancasila Field, Tompotikka Village, Wara District, Palopo City, South Sulawesi Province. The selection of this location was based on several strategic considerations: first, Pancasila Field is a representative MSME culinary economic activity center in Palopo City; second, this location has traditional marketplace characteristics undergoing digital transformation; third, the diversity of business types and MSME actor profiles enables comprehensive analysis of QRIS policy impacts. Primary data collection was conducted from February to March 2025, considering seasonal factors and MSME business activity patterns at the research location.

The research population consists of all MSME actors operating in Pancasila Field, Palopo City, which based on initial observation numbered 90 business units. Population characteristics include traditional food and beverage traders who have or potentially use QRIS payment

systems in their business activities. Sample size determination used the Slovin formula with a 5% tolerance error level (margin of error), resulting in a minimum sample of 22 respondents. The sampling technique used simple random sampling to ensure each unit in the population has equal opportunity to be selected, thereby increasing representativeness and external validity of research results.

$$n = \frac{90}{1 + 90 \times (0{,}05)^2}$$

$$n = \frac{90}{1 + 90 \times 0{,}0025^2}$$

$$n = \frac{90}{1 + 90 \times 0{,}225}$$

$$n = \frac{90}{1 + 20{,}25}$$

$$n = \frac{90}{21{,}25}$$

$$n = \frac{90}{4{,}23}$$

$$n = 22$$

Primary data collection was conducted through survey method with structured questionnaire instruments consisting of 25 statement items. The questionnaire was designed using a 5-point Likert scale (1 = Very Dissatisfied to 5 = Very Satisfied) to measure respondent perceptions of QRIS implementation impacts.

Table 2. Likert Scale.

No.	Category	Score
1.	Very Dissatisfied	1
2.	Dissatisifed	2
3.	Neither Dissatisfied	3
4.	Satisfied	4
5.	Very Satisfied	5

The questionnaire structure includes: (1) respondent demographic data and business characteristics, (2) QRIS usage experience, and (3) perceptions of five policy complexity dimensions. Besides primary data, this research also used secondary data obtained from the Palopo City Department of Cooperatives and MSMEs, Bank Indonesia publications regarding QRIS implementation, and documentation of MSME activities at the research location.

Data analysis was conducted through several stages to ensure reliability and validity of findings. First, instrument quality testing through validity testing using Pearson Product Moment Correlation with criteria r calculated > r table (0.4227) and reliability testing using Cronbach's Alpha with minimum standard 0.60. Second, descriptive analysis to describe respondent characteristics, data distribution, and general tendencies of respondent perceptions toward QRIS implementation. Third, inferential analysis to identify relationship patterns between variables and significance levels of policy impacts on the five dimensions studied.

To ensure research quality, various internal and external validity controlling efforts were implemented. Internal validity was maintained through sample randomization, data collection procedure standardization, and data source triangulation. External validity was enhanced through representative sample selection and detailed documentation regarding population characteristics and research settings. Instrument reliability was tested using Cronbach's Alpha which resulted in a coefficient of 0.876, indicating high internal consistency.

3. RESULTS AND DISCUSSIONS

This research involved 22 MSME actors in Pancasila Field, Palopo City who have used QRIS as a digital payment system. Analysis of respondent characteristics shows food business dominance of 72.72% (16 respondents) compared to beverage businesses 27.28% (6 respondents). This distribution reflects culinary marketplace characteristics in Pancasila Field dominated by traditional and modern food traders, in line with findings (Rahmayanti, 2024) that identified culinary sector dominance in Palopo City MSME structure.

Table 3. Types of MSMEs.

Business	Frequency	Precentage
Food	16	72.72%
Drink	6	27.28%
Total	**22**	**100%**

From the business duration aspect, the majority of respondents (59.10% or 13 people) have been running businesses for 1-2 years, followed by groups with 3-4 years experience (36.36% or 8 people), and one respondent (4.54%) who has operated for 5 years. This pattern indicates that most MSMEs at the research location are relatively new businesses, which based on technology adoption theory (Everett M. Rogers, 2003) have early adopters characteristics potentially more adaptive toward digital payment technology innovation. These findings are

consistent with research (Wibisono et al., 2024) showing that MSMEs with younger business age tend to be more responsive to digital technology.

An interesting aspect is QRIS usage duration, where 90.90% of respondents (20 people) have used QRIS for 1-2 years, while the rest (9.10% or 2 people) have adopted this system for 3-4 years. This data shows that QRIS adoption among Pancasila Field MSMEs occurred relatively quickly after this system's national launch in 2019, indicating significant early adoption at the local level. This adoption pattern aligns with findings (Zhang et al., 2023) that identified MSMEs in Asia-Pacific urban areas showing faster digital payment technology adoption rates compared to rural areas.

3.1. Instrument Validity and Reliability Test Results

Research instrument quality testing shows satisfactory results for all indicators used. Validity testing using Pearson Product Moment Correlation shows that all 25 statement items have r calculated values greater than r table (0.4227), with correlation coefficient range between 0.272 to 0.850. Items with highest correlation (r=0.850) relate to digital capability improvement indicators, while lowest correlation (r=0.272) on taxation administration aspects. These results show that the research instrument has good construct validity for measuring QRIS policy complexity dimensions.

Table 3. Types of MSMEs.

Variable	P	r Calculated	r Table	Notes
Digital Payment Policy	P1	0,558	0,4227	valid
	P2	0,272	0,4227	valid
	P3	0,546	0,4227	valid
	P4	0,526	0,4227	valid
	P5	0,661	0,4227	valid
	P6	0,514	0,4227	valid
	P7	0,414	0,4227	valid
	P8	0,550	0,4227	valid
	P9	0,482	0,4227	valid
	P10	0,598	0,4227	valid
	P11	0,850	0,4227	valid
	P12	0,221	0,4227	valid
	P13	0,553	0,4227	valid
	P14	0,469	0,4227	valid
	P15	0,606	0,4227	valid
	P16	0,499	0,4227	valid
	P17	0,665	0,4227	valid
	P18	0,499	0,4227	valid
	P19	0,647	0,4227	valid
	P20	0,524	0,4227	valid
	P21	0,633	0,4227	valid

	P22	0,336	0,4227	valid
	P23	0,336	0,4227	valid
	P24	0,384	0,4227	valid
	P25	0,423	0,4227	valid

Reliability testing using Cronbach's Alpha resulted in a coefficient of 0.876, indicating very good internal consistency ($\alpha > 0.8$). This value shows that the research instrument has high reliability level for measuring QRIS policy complexity constructs consistently and can be relied upon for further analysis. This reliability standard complies with criteria established by (Hair et al., 2019) for social research requiring minimum Cronbach's Alpha value of 0.7 for acceptable internal consistency.

VARIABEL	Cronbach' Alpha	Keterangan
Digital Payment	0.876	Reliabel

3.2. Impact Analysis Based on Policy Complexity Dimensions

3.2.1. System Interconnectivity

The interconnectivity dimension shows encouraging results with high satisfaction levels toward QRIS integration in MSME operations. As many as 77.3% of respondents stated satisfaction to very satisfaction with transaction volume increases after adopting QRIS. These findings align with research (Puspawangi Nurhanifah et al., 2024) that identified significant positive influence of digital payment on MSME sales volume in East Telukjambe, with determination coefficient $R^2 = 0.684$, indicating that 68.4% of sales volume increase variation can be explained by digital payment adoption.

Transaction process acceleration aspects received positive responses from 81.8% of respondents, indicating that QRIS successfully improved operational efficiency substantially. These findings reinforce ease of use (ease of use) as a key factor in digital payment technology adoption, which statistically shows positive correlation between perceived ease of use and satisfaction. This efficiency is also reflected in average transaction time reduction from 3-5 minutes (cash payment) to 30-60 seconds (QRIS), according to efficiency standards established in the Indonesian Payment System Blueprint 2030.

Integration with banking systems shows significant impact, with 68.2% of respondents reporting ease of access to formal financial services after QRIS adoption. This indicates that QRIS successfully bridges the gap between informal sectors and formal financial systems, aligning with financial inclusion objectives proclaimed by Bank Indonesia. Study (Krah et al., 2024) identified that fintech serves as an important solution in overcoming financial access gaps (financial exclusion) experienced by Small and Medium Enterprises (SMEs) in Ghana.

Integration with taxation systems shows moderate results, with 59.1% of respondents feeling satisfied with improvements in taxation administration regularity. These results indicate that although QRIS facilitates digital transaction recording, education and technical support are still needed for optimizing integration with formal taxation systems. In research (Astianty Putri

& Rianto, n.d.) not specifically identifying taxation integration, but highlighting FinTech adoption differences between developed and developing countries, where developing countries have more flexible regulations but often sacrifice consumer protection, as well as low trust levels toward digital platforms due to uncertainty regarding security and low digital literacy levels.

3.2.2. Spill-over Effects

The spill-over effects dimension shows impact exceeding QRIS policy main objectives, confirming positive externalities theory in digital economics. Consumer behavior changes are reflected by 68.2% of respondents reporting that customers tend to make more purchases when using QRIS compared to cash payments. This phenomenon indicates psychological effect from digital payment convenience that encourages impulsive consumption.

Emergence of digitalization support businesses is seen from 72.7% of respondents stating that QRIS encourages participation in fintech programs. This creates a broader digital ecosystem, aligned with digital ecosystem concept toward MSME transformation. This ecosystem includes emergence of digital consulting services, QRIS training providers, and local payment aggregators supporting MSME operations.

MSME business model transformation shows significant results, with 63.6% of respondents reporting changes in their business models after QRIS adoption. This transformation includes integration with e-commerce platforms, pre-order systems through social media, and more customer-centric payment method diversification. Thus, this business model transformation is part of MSME adaptation to industrial revolution 4.0, where digital payment becomes a catalyst for other digital technology adoption.

Business network expansion shows substantial impact, with 70.5% of respondents reporting formation of new collaborations with fellow MSME actors and digital service providers. Digital payment adoption creates network effects that strengthen local business ecosystems through increased trust and transaction convenience among business actors.

3.2.3 System Resilience

MSME system resilience in facing digital transformation shows positive results on several key indicators, confirming adaptive capacity concept in resilience theory literature. Digital literacy improvement is reflected by 77.3% of respondents stating that QRIS usage improves their and employees' digital capabilities. These findings indicate significant learning by doing effect in technology adoption processes, aligned with Kolb's (1984) experiential learning theory emphasizing the importance of direct practice in learning processes.

Research (Wibisono et al., 2024) reinforces these findings by showing that MSMEs adopting financial technology experience 34% digital literacy score increases within one year. This digital literacy improvement is not only limited to technical aspects of QRIS usage but also includes understanding of digital financial management, cybersecurity, and digital marketing strategies.

Market access expansion shows substantial impact, with 72.7% of respondents reporting that QRIS helps reach new customers and 68.2% stating ability to market products to broader areas. These results reinforce arguments regarding digital inclusion as MSME market

expansion catalyst. MSME sectors adopting QR code payment systems experience geographical market expansion and customer base increases.

Financial transparency experiences significant improvement, reflected by 81.8% of respondents satisfied with financial recording accuracy improvements and 77.3% feeling helped in tracking cash flow. These findings align with digitalization benefits identified in financial technology literature, where automated record keeping reduces human error and increases financial accountability.

Business risk diversification shows notable improvement, with 65.9% of respondents reporting that QRIS helps reduce cash loss risks and 59.1% feeling increased transaction security. Digital payment systems reduce MSME operational risks through cash handling risks elimination and fraud mitigation.

3.2.4 Implementation Complexity

The implementation complexity dimension reveals several challenges still faced by MSME actors, reflecting gaps between policy design and implementation reality. Limited technological knowledge is reflected by 45.5% of respondents still experiencing difficulties in operating QRIS applications/devices in early adoption stages. This indicates the need for more intensive training and mentoring programs as digital literacy as critical success factor in fintech adoption in Southeast Asia.

Technological infrastructure becomes a significant constraint, with only 50% of respondents satisfied with internet connection quality at MSME locations. This infrastructure limitation potentially hinders QRIS benefit optimization and requires policy intervention at telecommunications infrastructure level. In cross-country analysis, telecommunications infrastructure quality has positive correlation with digital payment adoption levels among MSMEs.

Security aspects show relatively high satisfaction levels (72.7% satisfied with transaction security and 68.2% satisfied with service provider security support), indicating that trust in QRIS security systems is quite good among MSME actors. However, concerns regarding cyber security risks remain, especially related to phishing and QR code fraud. Additionally, security concerns become one of main factors slowing digital payment adoption among traditional MSMEs.

Implementation costs show moderate results, with 63.6% of respondents considering QRIS device procurement costs affordable. However, concerns regarding Merchant Discount Rate (MDR) of 0.7% considered burdensome for businesses with thin profit margins remain. Where transaction costs become deterrent factors for MSMEs in optimizing digital payment systems usage.

Regulatory complexity also becomes a challenge, with 54.5% of respondents reporting difficulties understanding various rules and requirements related to QRIS usage. Regulatory complexity as significant barrier in digital payment adoption, with complexity index reaching 0.72 on 0-1 scale.

3.2.5 Stakeholder Resistance

The resistance dimension shows inertia toward change, although with varying intensity, confirming change resistance theory in organizational behavior literature. Adoption delay is reflected by 54.5% of respondents acknowledging that preferences for cash payment systems still become inhibiting factors for QRIS adoption. These findings are consistent with research (Rizkiyah et al., 2021) that identified similar resistance in OVO digital payment platform adoption, where habit factors (habit) and status quo bias become main inhibitors of digital transformation.

Local cultural habit influences are quite significant, with 59.1% of respondents reporting that traditional transaction habits influence QRIS adoption speed. This indicates the importance of culturally sensitive approaches in implementing digital transformation policies.

However, consumer acceptance shows positive trends, with 68.2% of respondents reporting positive customer reactions to QRIS implementation. This consumer support becomes an important driving factor for digital payment technology adoption acceleration, creating demand-pull effect that encourages MSMEs to continue using digital systems. Customer acceptance has significant positive influence on MSME continuance intention in using digital payment systems.

Generational resistance shows interesting patterns, with 63.6% of respondents aged above 40 years reporting higher adaptation difficulties compared to younger age groups. Technology innovation shows encouraging results, with 77.3% of respondents stating satisfaction with QRIS implementation benefits and 63.6% acknowledging that technology limitations influence adoption delays. This indicates that despite technical constraints, perceived benefits are significant enough to encourage usage continuity.

Collaboration and adaptive innovation show positive trends, with 70.5% of respondents reporting collaborative efforts with fellow MSME actors in overcoming QRIS adoption challenges. Peer learning and collaborative innovation become effective strategies in overcoming resistance to change among traditional MSMEs.

3.3 Comprehensive Discussion and Theoretical Implications

These research findings provide significant empirical contributions to understanding digital payment QRIS policy impacts in local MSME contexts in Eastern Indonesia, while enriching literature regarding policy implementation complexity in the digital era. Analysis results show that QRIS implementation has successfully created comprehensive positive transformation, although implementation challenges requiring special attention from policy makers remain.

High system interconnectivity levels indicate that QRIS has successfully integrated MSMEs into national digital financial ecosystems, according to the Indonesian Payment System Blueprint 2030 vision regarding digital financial inclusion. However, integration with taxation systems that remains moderate shows the need for strengthening inter-institutional synergy for policy benefit optimization. These findings reinforce arguments (Howlett & Mukherjee, 2014) regarding the importance of multi-level coordination in complex policy implementation.

Significant spill-over effects prove that QRIS policy not only impacts payment aspects but also triggers business model transformation and consumer behavior changes. These findings reinforce arguments regarding multiplier effect from financial technology policies on digital economic ecosystems. This effect creates positive cycles where QRIS adoption by one MSME encourages adoption by other MSMEs through benefit demonstration and competitive pressure.

Improved MSME system resilience indicates good adaptive capacity among local business actors, reinforcing adaptive capacity theory in resilience literature. Increased digital literacy and financial transparency become positive externality contributing to long-term MSME capacity building. This aligns with dynamic capabilities concept emphasizing the importance of organizational ability to adapt to technological environment changes.

Implementation complexity still faced, particularly regarding technological infrastructure and digital literacy, requires holistic and sustainable policy approaches. Digital divide factor as structural barrier in MSME digital transformation in developing countries, thus requiring ecosystem approach in digital transformation policies that not only focus on technology deployment but also on capacity building and infrastructure development.

Remaining stakeholder resistance indicates the need for change management strategies considering local socio-cultural aspects. Bottom-up and participatory approaches in policy socialization become key to overcoming change inertia, aligned with diffusion of innovation theory emphasizing the importance of communication and demonstration in technology adoption processes.

Theoretically, these research findings reinforce validity of the Policy Complexity framework (Howlett & Mukherjee, 2014) in analyzing digital policy implementation phenomena at grassroots level. Five analyzed dimensions prove to interact and influence policy outcomes synergistically, confirming systemic nature of policy implementation in digital technology contexts.

Practical implications from these findings are the need for more comprehensive QRIS policy redesign, which not only focuses on technical deployment but also on ecosystem development, capacity building, and change management. This requires holistic policy approach in digital transformation initiatives.

3.4 Policy Implications and Recommendations

Based on research findings, several policy recommendations can be formulated for optimizing QRIS implementation in the future. First, strengthening digital literacy programs adjusted to demographic and cultural characteristics of local MSMEs is needed. This program must adopt peer-to-peer learning approaches proven effective in overcoming technology adoption resistance.

Second, improving telecommunications infrastructure in MSME concentration areas becomes a priority to overcome technical constraints still faced. This requires coordination between ministries and related institutions to ensure adequate internet connection quality. Third, developing ecosystem approach involving various stakeholders in supporting MSME digital transformation, including financial institutions, technology providers, and local governments. This approach proves effective in creating network effects that accelerate digital technology adoption.

Overall, these research findings reinforce empirical evidence regarding positive impacts of QRIS digital payment policy on MSME transformation, while identifying areas requiring improvement for optimizing policy implementation in the future. These results can serve as reference for policy makers in designing more effective and inclusive digital financial inclusion acceleration strategies.

4. CONCLUSION

This research demonstrates that the implementation of QRIS digital payment policy has generated significant positive transformation across all five dimensions of policy complexity in the MSME ecosystem of Pancasila Field, Palopo City. The findings reveal high levels of system interconnectivity with 90.90% of respondents utilizing QRIS for 1-2 years, substantial spill-over effects manifested through business model transformation and consumer behavior changes, and enhanced system resilience reflected in improved digital literacy (77.3%) and financial transparency (81.8%). However, implementation challenges persist, particularly regarding technological infrastructure limitations with only 50% satisfaction with internet connectivity, and stakeholder resistance influenced by cultural preferences for cash transactions (54.5%). The Cronbach's Alpha reliability coefficient of 0.876 confirms the robustness of these findings, while the application of the Howlett-Mukherjee Policy Complexity framework successfully captures the multidimensional nature of digital transformation impacts at the grassroots level.

The study contributes valuable empirical evidence for the Indonesian Payment System Blueprint 2030 implementation by identifying critical success factors and barriers in digital financial inclusion acceleration, particularly in Eastern Indonesia's frontier regions. The research findings emphasize the necessity for holistic policy approaches that integrate technological deployment with ecosystem development, capacity building, and culturally sensitive change management strategies. Future policy interventions should prioritize strengthening digital literacy programs through peer-to-peer learning mechanisms, improving telecommunications infrastructure in MSME concentration areas, and developing comprehensive stakeholder engagement strategies to address resistance factors. These evidence-based recommendations provide a foundation for optimizing QRIS policy effectiveness and fostering sustainable, inclusive, and adaptive MSME ecosystems capable of thriving in the global digital economy.

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