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Analysis of effect exerted by Adoption of the QRIS Digital Payment System on the Performance of Central Java MSMEs: TOE Framework Approach

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A B S T R A C T
The digital transactions method has not only changed the payment steps from cash to digital but has also improved the performance of Micro, Small, and Medium Enterprises (MSME's) and also improve business quality by expanding market reach, facilitating transactions, following digital payment trends, reducing the risk of theft, and MSMEs can be more optimized for of time, energy, and also costs. The analysist aims to examine this effect of Technology Organization Environmental (TOE) on the use of QRIS on MSME performance and identify factors that encourage MSMEs in Central Java Province to use QRIS. This study uses the SEM-PLS approach with SmartPLS software version 4.0. The results of this study reveal that the adoption of QRIS digital payment by MSMEs has a positive and substantial impact on MSME Performance in Central Java Province. This study also shows that, in adopting the QRIS digital payment system, MSMEs in Central Java Province are influenced by the following factors: net benefit, top management support, entrepreneurial attitude, institutional readiness, community influence, and state support.

INTRODUCTION

As among the drivers that associated to national economy, Micro, Small, and Medium Enterprises (MSMEs) have a significant impact on Indonesian economic development. Facilitating Ministry for Economic Affairs of the Republic of Indonesia (2023) Indonesia has 65.5 million MSME units that can contribute 61.07% to the Gross Domestic Product (GDP) with a value of Rp9,580 trillion per year and involve 120.59 million workers or around 97% of the total workers in Indonesia. The Ministry of Investment/Investment Coordinating Board of the Republic of Indonesia stated that the value of MSME investment commitments is Rp138.8 trillion with details of Rp74.3 trillion being the value of micro business investment and Rp64.5 trillion being the value of small and medium business investment (Lida Puspaningtyas, 2023). The role of MSMEs has a big influence in increasing the country's economic growth and can become a source of labor providers in Indonesia so that it can reduce and increase community welfare (Aliyah, 2022).

Although MSMEs make significant contributions, their improvement is hampered attributed to multiple determinants several factors, namely, restricted access to world's market, in insufficiency managerial competency and training, government policies and laws, and lack of access to appropriate technology; therefore, a lot of MSMEs are considered financially and firmly constructed (Donkor et al., 2018). One of the projected changes for MSMEs is to focus on access to appropriate technology, namely by digitizing businesses so that they can compete globally and be able to increase their contribution to the country's economy.

One of the digitalization steps that can be implemented is digital payments. Digital payments refer to transactions of goods and services using modern transaction tools such as computer networks, the Internet, and digital systems (Wyllie et al., 2010). The digital payment process is carried out without requiring physical cash but can be done via Short Message Service (SMS), M-banking, internet banking, e-wallet, or e-money.

The transition to digital payments can encourage the creation of breakthrough in technological development. The development of technological breakthrough opens up minds that think critically and excel in the field of Science and Technology as a means of life to achieve happiness both in this world and in the afterlife (QS. Al-Qashash/28: 77; QS. An-Nahl/16: 43; QS. Al-Mujadilah/58: 11; QS. At -Taubah/9: 122). The Islamic view will continue to support the development of technological breakthrough and will not limit it as long as the technology produced brings maslahat to the people and is by Sharia principles because Islam is open-minded toward knowledge from various sources (Nafiah & Faih, 2019).

Support from the Indonesian government through Bank Indonesia has launched various initiatives, one of which is the Quick Response Code Indonesian Standard (QRIS) which is a national QR code standard used for digital transaction process payment media. QRIS was issued related Bank Indonesia together with the Indonesian Payment System Association (ASPI) on August 17, 2019. Coinciding with January 1st, 2020, Bank Indonesia has required

all Payment System Service Providers (PJSP) to use QRIS both from banks and others, for example mobile banking, DANA, GoPay, ShopeePay, OVO, LinkAja, and others (Bank Indonesia, 2023).

The Indonesian government believes that QRIS has an easy payment system that can trigger e-commerce activities, open up new business opportunities, and increase market reach (Laras, 2023). This can increase the wheels of the country's economy to continue moving in a positive direction for MSMEs. Bank of Indonesia (2023) also stated that the use of QRIS provides many benefits for MSMEs, including easier transaction patterns, automatic financial recording, reduced risk of losing cash, no need to provide change, and many other benefits.

According to the analysis Pulungan et al. (2022) stated that QRIS is following Sharia principles, namely maqashid sharia. The application of maqashid sharia in QRIS, states that the system and contract in the QRIS payment process do not cause losses and do not conflict with sharia principles because they have fulfilled the principles of muamalah, namely "an-tardhin" which means that there is an activity of mutual consent between users. The procedures and benefits of QRIS are in line with the principles of maqashid sharia, namely the principle of safeguarding assets (hifdz mal). Safeguarding assets can be defined as assets that are obtained clearly and following the provisions of the muamalah maliah contract, such as every transaction must be recorded, witnessed, and can be guaranteed so that each party in the contract is mutually consenting (Ahmad Junaidi et al., 2021).

More broadly, the principle of maqashid syariah safeguarding assets (hifdz mal) in QRIS can achieve the profitability projected by MSMEs. Every MSME involved in a sustainable business will experience economies of scale when production costs are reduced by increasing production volume (Mankiw, 2011). The role of economies of scale is in line with the principle of hifdz mal which can create profits in every transaction. The more transactions that come in, the business actor will gain the benefits of efficiency of time, energy, and costs so that the financial recording process is automatically systematic and guaranteed security (Ekasari et al., 2021).

However, with all these benefits, in reality, many MSMEs have not adopted QRIS as a means of business transactions. According to a report from Bank Indonesia in the second quarter of 2022, the number of merchants using QRIS in Central Java reached 1,480,597, while the number of MSMEs in Central Java reached 4.3 million (Anhar, 2021). The data illustrates that the use of QRIS by merchants (MSMEs) on Central Java has only reached 35% or around 65% have not used QRIS. The 35% figure illustrates that QRIS adoption in Central Java Province is still below from national average of 40%.

This study uses the theory of technology acceptance from Tornatzky & Fleischer (1990) namely the Technology Organization Environmental (TOE) model. This study was conducted to test effect exerted by adopting QRIS digital payments on the achievements of MSMEs operating in Indonesia, especially Central Java Province.

LITERATURE REVIEW

Profit Maximization Theory

Companies will try to achieve the highest level of profit by maximizing the difference between revenue and costs. The two main components of this theory can be applied to MSMEs using QRIS; Marginal Revenue (MR) and Marginal Cost (MC). Marginal revenue refers to the additional income obtained by MSMEs after selling additional units of goods or services. Meanwhile, Marginal cost refers to the extra costs required to produce the goods or services (Mankiw, 2011).

Digital payment QRIS makes digital transactions more efficient, fast, and secure, MSMEs can expand their market and increase transaction volume and Total Revenue (TR). The convenience of non-cash payments speeds up the transaction process, allowing MSMEs to serve more customers in less time. Therefore, along with the increase in transaction volume recorded through QRIS, Marginal Revenue (MR) increases. QRIS also reduces the marginal costs that MSMEs usually incur in terms of cash transactions or the use of EDC (Electronic Data Capture) machines, which tend to be more expensive and require more human resources to manage (Kwabena et al., 2019).

In addition, QRIS reduces manual recording and administration costs and reduces cash transaction errors. MSMEs can increase profit margins by reducing operational costs. This is following the principles of profit maximization theory, namely minimizing costs and maximizing revenue, so that MSMEs can achieve more optimal profits with increased revenue and lower costs. These various advantages will be the benchmark for improving MSME performance after adopting QRIS technology.

Overview of the Technology-Organization-Environment (TOE) Model

The theory of Reasoned Action (TRA) by byAjzen & Fishbein (1980) and a Theory of Planned Behavior (TPB) byAjzen (1991) is a classic theory used by previous research to explain human behavior related to the adoption and use of new technology. Furthermore, based on the theories above, the technology acceptance model (TAM) developed byDavis (1989), states that ease of use and perceived usefulness are drivers that describe individual attitudes toward technology adoption to ascertain intentions to use, which results in technology embrace. All theories mentioned above are mostly used in research to determine individual attitudes toward technology adoption. However,Wong (2020) state that organizational and environmental parts are often omitted. Although TAM was utilized in previous studies related to digital payment adoption, TAM focused on individual and customer based factors.

Empirical findings from studies that implement the TOE model have confirmed that this model is valuable for understanding the adoption of information technology-based breakthroughs (Tajudeen et al., 2018). In addition, the TOE framework has a strong conceptual foundation and empirical support to the point that it has been used to investigate the implementation of new technology by MSMEs (Khan & Ali, 2018). The

researcher chose the TOE model as the conceptual foundation because of the following arguments; First, this framework has been widely used by previous researchers to explore closely related topthe ics such as cloud computing, social media, mobile commerce, mobile payments, and other related issues (Chau & Deng, 2018; Khayer et al., 2020; Tajudeen et al., 2018). Second, the TOE framework considers several complex factors including the organization and the environment, rather than focusing on a single technology factor. Third, the TOE framework contains a shared perspective that accepts that business change is not only driven by people in the business but also by aspects of the business (Hameed et al., 2012). Therefore, this study uses several TOE factors to test effect exerted by using QRIS technology on MSME performance and also to determine key drivers of MSME actors to use QRIS technology.

Technology Context

The technological context includes the state of internal and external technology relevant to the organization or company. Internal technology describes the technology currently used by the organization. While external technology describes the technology offered in the market and not yet used by the organization. Consideration of technological factors is done to minimize losses when adopting technology (Baker, 2012). Abed (2020) concludes that technological factors in an organization are described by the characteristics of information technology breakthrough that can influence the organization to adopt this technological breakthrough.

Net benefit is the extent to which a breakthrough is perceived as better than the idea it replaces (Rogers, 1995). This study focuses on the projected benefits of adopting a particular technology (Tajudeen et al., 2018). Net benefit is an important dimension to study because it describes the benefits provided by technological breakthrough. The existence of benefits offered will increase the possibility of the adoption of technology by an organization (Rogers et al., 2019). The use of QRIS technology is projected to provide diverse advantagess for MSMEs, such as efficiency of time, energy, and costs, as well as enabling easier payment transactions (Khan & Ali, 2018).

Compatibility is defined as the extent to which an breakthrough is perceived as being in line with the values, past experiences, and needs of potential adopters (Rogers, 1995). An breakthrough that is incompatible with the values or norms in a social system will not be adopted as quickly as a compatible breakthrough. SMEs need to seek information on the suitability of technology to determine the possibility of technology adapting to existing processes in the business without having to spend a lot of money on training staff and changing existing technology (Effendi et al., 2020).

Several previous studies have shown that compatibility is a factor that has a significant positive relationship with technology adoption conclusions. The study Setiyani & Rostiani (2015) related to e-commerce adoption by MSMEs in Karawang, the results of which state that Compatibility has a positive and significant effect on e-commerce adoption by MSMEs in Karawang. Meanwhile, in an empirical study related to digital payment or

mobile payment, there is research Kwabena et al., (2021) also state that net benefit and compatibility have a significant positive influence on mobile payment adoption. Therefore, the following hypothesis is proposed.
H1a*:* Net benefit a significant influence on the adoption of the QRIS Digital Payment System by MSMEs in Central Java Province
H1b*:* Compatibility has a significant influence on the adoption of the QRIS Digital Payment System by MSMEs in Central Java Province

Organization Context

The literature review also shows that top management support, entrepreneurial orientation, and organizational readiness are the most widely used factors as measures in the organizational context. The study (Chau & Deng, 2018; Kwabena et al., 2019b; Nguyen et al., 2022) said that top management support, entrepreneurial orientation, and organizational readiness are critical determinants in the organizational context, the results of which show a positive and significant influence on adoption.

Top management support defined as the mindset and behavior of company managers in supporting technology implementation (Setiyani & Rostiani, 2015). Tornatzky & Fleischer (1990) said the top management support factor is one of the important factors in the adoption of breakthrough. Top managers can play a role in the process of adopting breakthrough because a manager is responsible for every change in the organizational or company environment. They are also the ones who make conclusions both strategically, technically, and operationally (Damanpour & Schneider, 2006). Lack of manager support for the breakthrough adoption process will cause the adoption process to fail (Nguyen et al., 2022).

Entrepreneurial orientation is identified as a critical element for business growth in the digital realm. Businesses with a strong focus on business operations are able to experiment and learn new ideas from existing practices. Methods, practices, and conclusion-making are emphasized in entrepreneurial orientation, which is used by managers to run businesses responsibly (Nguyen et al., 2022).

Organizational readiness is the readiness of a company or business to implement a technology Kwabena et al., (2021) explain the readiness in question includes financial readiness and technological readiness. Financial readiness includes installation costs, implementation, ongoing costs during use, etc. Technological readiness refers to the readiness of the infrastructure for the implementation of the technology itself such as hardware and competency readiness of its employees.Bank of Indonesia (2023) explains the form of readiness required by MSMEs in adopting including knowledge about information technology from the use of the QRIS payment system by MSME owners or employees, the availability of a place to store QRIS barcodes, or the availability of the internet and EDC machines if you want to make QRIS transactions through the customer presented mode method, all of which are included in the readiness of the technology infrastructure. In addition, the form of financial readiness also needs to be carried out by

MSMEs, namely providing a personal bank account. Therefore, the following hypothesis is proposed.

H2a: Top Management positively influences significant influence on the adoption of the QRIS Digital Payment System by MSMEs in Central Java Province.

H2b*:* Entrepreneurial Orientation has a significant influence on the adoption of the QRIS Digital Payment System by MSMEs in Central Java Province.

H2c: Organization Readiness has a significant influence on the Adoption of the QRIS Digital Payment System by MSMEs in Central Java Province.

Environmental Context

Competitive pressure is the level of pressure felt by companies in the industry (Zhu & Kraemer, 2005). Ahmad et al. (2019) argue that competitive pressure can be linked to the industry structure factor in the TOE model. This is because the adoption of technology by a company can give the company the ability to influence the structure of its industry. In turn, the adoption of technology can change the way competition operates in the industry, providing a competitive advantage.

Collective influences defined defined as how much a person perceives the importance of other people's beliefs that he or she should use a technology (Kwabena et al., 2019b). Venkatesh et al. (2003) said that a person's behavior can be influenced by social circles because they have reciprocal relationships and harmony in the group. The social circle or other people can be friends, superiors, relatives, and family members who believe that the use of technology is something important to do. Therefore, the hypothesis proposed is as follows.

Government support describes the support and guidance received by business actors in developing new technologies. Government support includes technical support, training, and coaching for business development (Nguyen et al., 2022). Researchers stress that government support is essential to spur the use of new technologies.

H3a: Competitive Pressure has a significant influence on the Adoption of the QRIS Digital Payment System by MSMEs in Central Java Province

H3b: Collective influences has a significant influence on the Adoption of the QRIS Digital Payment System by MSMEs in Central Java Province

H3c: Government Support has a significant influence on the adoption of the QRIS Digital Payment System by MSMEs in Central Java Province

MSME Performance

The concept of performance refers to the results of work or work achievements. However, more broadly, performance does not only include the results of work but also involves the process of carrying out work (Prastika & Purnomo, 2014). Thus, it can be said that the performance of MSMEs includes the work results of MSME business actors. Meanwhile,Ananda Mutiara et al. (2021) state that MSME performance refers to the actual benefits obtained by MSMEs from technology, both in terms of financial and non-financial performance.

Therefore, when MSMEs adopt QRIS, cash handling costs will be reduced, sales will increase, the purchasing process will be faster, and it will allow them to make payments open to anyone, regardless of location. With limited research in the context of QRIS adoption and its impact on MSME performance, we propose the following hypothesis:
H4: Adoption of the QRIS Digital Payment System has a significant impact on the performance of MSMEs in Central Java Province

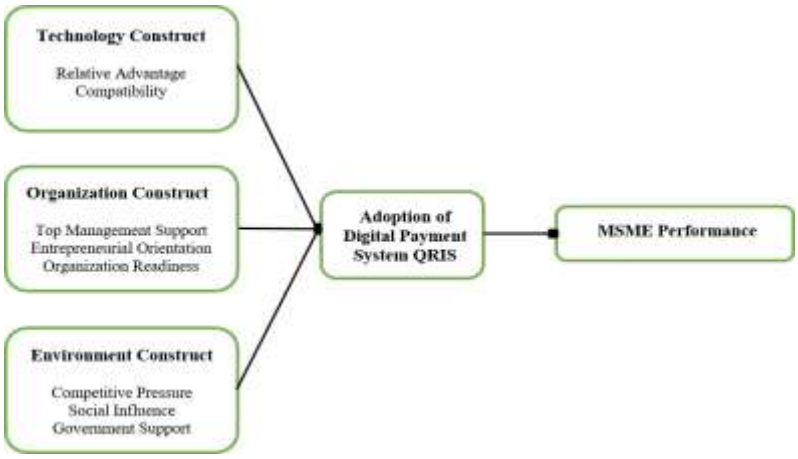

Figure 1. Conceptual Framework

METHODOLOGY

This study uses a structural equation model (SEM) applied by previous research related to technology adoption (Ahmad et al., 2019; KWABENA et al., 2021a; Nguyen et al., 2022; Oliveira et al., 2014; Tajudeen et al., 2018). SEM is a multivariate statistical tool used assess structural relationships relationships. Furthermore, it is a combination of multiple regression and factor analysis and is used to assess the relationship between constructs and latent variables (Khan & Ali, 2018). This analysis approach is widely used by researchers because it predicts many interrelated dependencies. In addition, this method uses two types of variables, namely dependent variables and independent variables. SEM PLS is used to validate the proposed hypothesis and can model linear relationships between constructs (Khan & Ali, 2018).

This study chose a non-probability sampling method that does not provide equal chances for an equal opportunity for each component of the population to be selected as a sample. Sugiyono (2013) states that there are several types of techniques in this method, namely systematic, quota, accidental, purposive, saturated, and snowball sampling.

The following criteria were determined for sampling in this study, namely:

1. Have an MSME (Micro, Small, and Medium) business in the Central Java Province
2. MSME businesses have implemented or used the QRIS digital payment system in their business operations with a minimum usage period of 6 month.

According toFerdinand (2006), If the study uses structural equation modeling analysis, the determination of the smallest size of samples needed in the study is 4 to 8 times the number of indicator statement items. This study has 31 indicators. So the smallest size of samples that must be met is 5x31 equals 155. However, this study has exceeded the smallest size so the sample data has met the criteria for statistical analysis. The researcher increased the number of samples and collected 165 respondents to account for errors made when filling out the questionnaire.

RESEARCH RESULT

Assessment of Measurement Model

According toRoldán & Sánchez-Franco (2012), a technique for measuring the model is needed to evaluate personal item reliability, internal consistency, content validity, convergent validity, and discriminant validity.Nunnally (1978) recommends that Cronbach's alpha (CA) should be higher than 0.70. In addition, in the internal consistency reliability assessment(Bagozzi, 1977), it is recommended that the composite reliability (CR) of the construct should be higher than 0.70. While for the convergent assessment of reliability(Fornell & Larcker, 1981), suggests that the average variance extracted (AVE) should be equal to or exceed 0.5.

Table 1. Measurement Model

Variables	Items	Loading	CA	CR	AVE
Net benefit	X.1.1, X.1.2, X.1.3	0.910 to 0.937	0.919	0.949	0.861
Compatibility	X.2.1, X2.2, X.2.3	0.842 to 0.894	0.844	0.906	0.762
Top Management Support	X.3.1, X3.2, X.3.3	0.825 to 0.867	0.802	0.882	0.714
Entrepreneurial Orientation	X4.1, X4.2, X4.3	0.843 to 0.871	0.820	0.893	0.736
Organization Readiness	X5.1, X5.2, X5.3	0.886 to 0.904	0.879	0.925	0.805
Competitive Pressure	X6.1, X6.2, X6.3	0.889 to 0.908	0.883	0.928	0.811
Collective influences	X7.1, X7.2, X7.3	0.891 to 0.906	0.882	0.927	0.808
Government Support	X8.1, X8.2, X8.3	0.869 to 0.935	0.891	0.932	0.822
Adoption of Digital Payment System QRIS	Z1, Z2, Z3	0.858 to 0.887	0.846	0.907	0.765
MSME Performance	Y1, Y2, Y3	0.805 - 0.848	0.849	0.897	0.686

Table 2. Discriminant Validity Coefficient

	X1	X2	X3	X4	X5	X6	X7	X8	Y	Z
X1	**0.928**									
X2	0.748	**0.873**								
X3	0.333	0.388	**0.845**							
X4	0.647	0.540	0.293	**0.858**						
X5	0.680	0.593	0.346	0.431	**0.897**					
X6	0.688	0.673	0.361	0.624	0.640	**0.900**				
X7	0.573	0.632	0.364	0.539	0.580	0.746	**0.899**			
X8	0.388	0.365	0.145	0.397	0.204	0.369	0.348	**0.906**		
Y	0.267	0.226	0.192	0.260	0.186	0.365	0.298	0.242	**0.828**	
Z	0.762	0.688	0.428	0.651	0.664	0.740	0.703	0.445	0.316	**0.874**

Structural Model Assessment

This study uses a structural model that is assessed through the coefficient of determination and hypothesis testing according toHair et al. (2019), the structural model should be used to assess the linear regression effects of the dependent variables on each other. This study uses PLS to find the path coefficient, p-value, and determination coefficient (R2).

Table 3. Strength of Model

	R-square	**R-square adjusted**
Adoption of the QRIS (Z) Digital Payment System	0.741	0.728
MSME Performance (Y)	0.100	0.094

The coefficient of determination for the use of digital payment system QRIS is 0.741, which indicates that 74.1% of changes in the use of digital payment QRIS occurred due to the construction used in the study. In addition, changes in SME performance by 10% occurred due to technological, organizational, and crucial elements, and the use of the digital payment system QRIS.

Table 4. Path Coefficient and Hypothesis Evaluation

Relationship	**Beta**	**Mean**	**Standard deviation (STDEV)**	**T values**	**P values**
Net benefit -> Adoption of the QRIS Digital Payment System	0.272	0.270	0.104	2,630	0.009
Compatibility > Adoption of the QRIS Digital Payment System	0.035	0.025	0.081	0.430	0.667
Top Management Support -> Adoption of the QRIS Digital Payment System	0.100	0.095	0.048	2,058	0.040
Entrepreneurial Orientation -> Adoption of the QRIS Digital Payment System	0.133	0.137	0.065	2,049	0.041

Organization Readiness -> Adoption of the QRIS Digital Payment System	0.149	0.151	0.075	1,988	0.047
Competitive Pressure -> Adoption of the QRIS Digital Payment System	0.126	0.142	0.107	1,171	0.242
Collective influences -> Adoption of the QRIS Digital Payment System	0.197	0.188	0.085	2,322	0.020
Government Support -> Adoption of the QRIS Digital Payment System	0.114	0.113	0.051	2,234	0.026
Adoption of Digital Payment System QRIS -> MSME Performance	0.316	0.327	0.093	3,386	0.001

DISCUSSION

The results of technology construction net benefit found relevant in the conclusion of MSMEs to adopt the QRIS digital payment system which is indicated byβ=0.272. The t-statistic value produced for the relationship between these two constructs is 2,630> 1.654 and the resulting p-value is 0.009 < 0.05. MSMEs use QRIS because the level of benefits provided can provide efficiency of time, energy, and costs. the results obtained in this study are consistent with (Kwabena et al., 2019b). However, the compatibility variable was found to be irrelevant in the conclusion of MSMEs to adopt the QRIS digital payment system due to the limited knowledge of MSMEs and consumers in Central Java. MSME actors experience limitations in accessing QRIS which is considered not to provide suitability for MSME performance. This research is in line with that conducted by Sayginer & Ercan (2020).

Organizational and environmental constructs with variables of top management support, entrepreneurial orientation, organizational readiness, collective influences, and government support have a significant and positive influence on the use of the QRIS digital payment system. The findings of in line withs are consistent with research (Kwabena et al., 2021b; Nguyen et al., 2022). However, the environmental construct related to competitive pressure shows no statistically significant impact on the use of the QRIS digital payment system, because QRIS is still in the early adoption stage in the region, there is little or no competitive pressure that forces organizations to immediately adopt the technology. Competitive pressure usually increases as technology adoption increases and more competitors emerge in the market. In line withs are in line with research that has been conducted by Oliveira et al. (2014) that competitive pressure shows no statistically significant influence on the adoption of new technologies.

The results of this study are significant and positive in the adoption of the QRIS digital payment system on the performance of MSMEs in Central Java Province. Impact MSMEs adopting QRIS can increase sales and profits,

efficiency of time, energy, and costs, increase customer satisfaction, and reduce production costs after adopting the QRIS digital payment system. This explains that adopting QRIS can significantly affect MSME performance. The results of the study were found to be consistent with the research (Aprisca & Aligarh, 2024; Kwabena et al., 2021b; Kwabena et al., 2019; Nguyen et al., 2022; Sulistyaningsih & Hanggraeni, 2021).

CONCLUSIONS AND RECOMMENDATIONS

This study was conducted to examine the influence of the TOE factor on the adoption of QRIS digital payments in the context of MSMEs operating in Indonesia, especially Central Java Province. The results of the study prove that the TOE factor has a significant impact on the adoption of the QRIS digital payment system. It has also developed that the adoption of the QRIS digital payment system also has a significant effect on the performance of MSMEs in Central Java. This study shows that by adopting QRIS, MSMEs can expand their market reach, facilitate customer transactions, follow digital payment trends, be optimized for of time, energy, and costs, increase sales and profits, and reduce production costs.

ADVANCED RESEARCH

This study contributes to the existing literature on QRIS and extends the TOE framework in the context of the QRIS digital payment system. Several previous studies only focused on the intention to adopt digital payments, while this study proves effect exerted by digital payment adoption on MSME performance. This study is limited to one area of Central Java Province only. Therefore, future research can be undertaken in others wider areas due to cultural different approaches and their changes the results.

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