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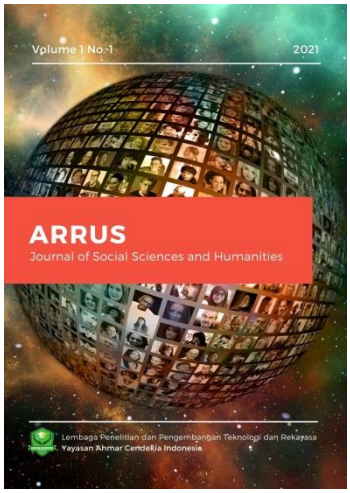

RESEARCH / REVIEW ARTICLE

Beyond Adoption Metrics: A Multi-Criteria Performance Assessment of QRIS in Advancing MSME Digitalization

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Abstract: The Quick Response Code Indonesian Standard (QRIS) has significantly accelerated the rapid development of electronic payment systems in Indonesia, accelerating the country's transition to a cashless economy. However, the majority of recent evaluations have focused on measuring adoption rates and transaction volumes, thereby ignoring the complex effects of QRIS on small business operations. By developing a quantitative framework for Multi-Criteria Decision Analysis (MCDA) that goes beyond simple descriptive analysis in assessing the contributions of QRIS, this study aims to close the research gap. The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) and the Analytic Hierarchy Process (AHP), whose criteria weights were determined using the Geometric Mean Method, were both used in an applied quantitative technique to rank MSME performance. This analysis analyzed six criteria: financial transparency, consumer trust and digital literacy, cost reduction, revenue growth, transactional efficiency, and formal financing. The findings indicate that revenue growth and formal funding were identified as the most significant criteria, each with a weight of 0.20, and that the results derived from the AHP had an adequate consistency level (CR = 0.067). With the top performance achieving a closeness coefficient of 1.000, the TOPSIS technique ranks the five MSMEs as follows: A5 > A3 > A4 > A1 > A2. By shifting the emphasis from access to measurable performance outcomes, the findings promote financial inclusion theory and support digital payment ecosystem theory by highlighting the importance of organizational capability in attaining fintech advantages. Policy implications suggest that targeted MSME capacity-building and credit-linkage integration should be implemented in tandem with the expansion of QRIS. Overall, the study demonstrates that performance-based MCDA evaluation offers a strict foundation for regulating digital payments in emerging economies.

Keywords: AHP, Multi Criteria Decision Making, TOPSIS, QRIS

1. INTRODUCTION

In 2019, Bank Indonesia launched the Quick Response Code Indonesian Standard, known as "QRIS," to provide a cohesive standard for QR-based payments in Indonesia(Aryowiloto et al., 2024; Widyawan et al., 2024). The objective is to consolidate all existing independent digital payment systems in Indonesia into a unified framework. This regulation signifies a substantial alteration in the framework of retail payment systems in Indonesia, especially in accelerating the transition to a "cashless society." Through QRIS, Bank Indonesia has effectively resolved challenges related to technical system incompatibility, transaction efficiency, and access to digital payment systems for micro, small, and medium-sized

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firms(Muhammad Hilmansyah Lukman et al., 2025). In a macroeconomic context, QRIS has been implemented as both a technological and institutional innovation, with the objectives of enhancing financial inclusion, ensuring financial system stability, and promoting economic integration within the digital economy(Agustiana et al., 2025; Fauziah et al., 2025).

Fast smartphone adoption, improved internet accessibility, and the rise of financial technology platforms have all been aspects of Indonesia's digital transformation. Micro, small, and medium-sized businesses (MSMEs) is essential to the Indonesian financial ecosystem since they create jobs and boost the country's GDP(Hamzah Muchtar et al., 2024). Structural barriers that the MSME sector experiences include limited formal funding options, financial record transparency, and cash management costs. By enabling transparent financial transactions, the QRIS system's introduction is expected to allay these worries.

Many people believe that the idea of a cashless society represents a natural progression from paper money to electronic means of exchange(Hamzah Muchtar et al., 2024). It is believed that the transition to a cashless society represents an evolutionary change in the economy, human behavior, and technology(Fauziah et al., 2025). The theoretical framework of financial inclusion theory, which looks at the quality, accessibility, and use of financial services, has an impact on the adoption of digital transaction methods. The Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM) emphasize the significance of social influences, perceived utility, and perceived ease of use in the adoption of digital transaction systems. Although these frameworks do a good job of addressing the adoption of technology, they fall short when it comes to assessing the results of economic success.

Most of the empirical research that is currently available on the effectiveness of QRIS and digital payments in Indonesia focuses on adoption rates, transactional growth metrics, or descriptive survey approaches to evaluate user happiness and system usability(Mahyuni1 & Setiawan, 2021). Although these studies offer insightful information on adoption trends, they usually use composite index or single-factor approaches, which are usually connected to compensatory aggregation. However, these approaches tend to hide the underlying structural issues. Alongside persistent digital illiteracy or slow organizational revenue growth, the system may experience substantial transactional growth. Thus, a more sophisticated, performance-based approach to evaluating the system's effectiveness in promoting the MSME initiative and the cashless society must be developed.

Contribution assessment goes beyond only assessing transaction volume, according to the policy evaluation technique. To conduct a thorough assessment of contribution, it is necessary to look at operational effectiveness, changes in cost structure, revenue growth, improvements in transparency, financial accessibility, and trust building. Since the traits are inherently diverse, unidimensional metrics cannot be used to evaluate them. The examination of numerous contribution indicators within a coherent framework is made easier by Multi-Criteria Decision Analysis (MCDA).

When evaluating financial technology, the ability to handle intricate problems makes multi-criteria decision analysis crucial. MSMEs may take advantage of digital platforms and get faster transaction speeds with the QRIS concept(Angelicia et al., 2024; Zalukhu & Sembiring, 2025). Although reducing cash handling costs can also lead to cost efficiency, there may be countervailing effects such as the merchant discount rate and device maintenance costs. As such, the model needs to be able to recognize the trade-offs. Ranking systems like TOPSIS(Lestari et al., 2018) or VIKOR(Siregar et al., 2018) can be used to compare performance to the ideal standard, and the Analytical Hierarchy Process(Mahase et al., 2016), Best Worst Method(You et al., 2016), or Entropy Weighting can be used to determine the relative importance of the criterion.

The evaluation procedure is clearly emphasized in the Indonesian regulatory system. Interoperability, financial inclusion, consumer protection, and the digital environment are the main priorities of Bank Indonesia's payment system blueprint. At the organizational level,

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measurable economic results should be used to evaluate the effectiveness of policies rather than adoption rates. Digital payment systems and actual economic activity are connected by Micro, Small, and Medium-Sized Enterprises (MSMEs). As a result, their success is a crucial indicator of how well QRIS is working to create a cashless society.

There are numerous ways to understand the role and importance of Quick Response Code Indonesian Standard(QRIS) in the development of a cashless economy. The most important factor is transaction efficiency(Hani Lutpiah Sungkar, 2025), which includes cutting down on transaction time, simplifying the reconciliation procedure, and eliminating cash handling errors. The second is cost-cutting, which includes lower administrative costs, a lower chance of theft, and more efficient accounting procedures(Dodhy Hyronimus Ama Longgy et al., 2025). The third factor is revenue enhancement, encompassing an increase in consumer numbers and transaction frequency facilitated by technological convenience. The fourth dimension is the augmentation of financial transparency, encompassing enhanced record-keeping, greater creditworthiness, and increased tax compliance. The fifth dimension encompasses consumer trust and knowledge, which involves socio-behavioral changes among consumers(Mareta & Meiryani, 2023). The sixth component pertains to access to the formal financial system, encompassing integration with this system and enabling micro, small, and medium-sized firms to utilize transaction histories.

Despite the individual examination of each element in prior studies, a comprehensive assessment of overall performance is necessary. The lack of a structured decision-support system leads to fragmented policy interpretations. A high rate of transaction adoption may be perceived as a policy success; nevertheless, there is no assessment of whether profitability has been improved. Likewise, operational issues may be perceived in isolation, whereas advantages may materialize over time. A model based on MCDA is proposed for a comprehensive assessment of performance.

Another significant factor to examine is the heterogeneity of MSMEs. Micro firms typically have restricted capacity for technology adoption, whereas medium-sized enterprises may have already used digital accounting systems. The anticipated consequences of QRIS are projected to differ among different enterprise categories. The systematic methodology for evaluating enterprise performance will facilitate comparative comparison among different groups and assist in determining the equitable distribution of the benefits of digital payments.

The discussion on cashless societies is now associated with the concept of digital sovereignty and the stability of payment systems on a global scale(Jatmika et al., 2024; Rabbani & Herman, 2024). Using the QR system to implement standard payment protocols reduces dependency on infrastructures and improves cooperation between different financial institutions. The term "QRIS" in Indonesia refers to the domestic payment system that is regulated to guarantee payment system autonomy. Understanding the soundness of the financial system at the macro level requires evaluating the impact at the MSME level(Nurdin et al., 2025).

This study addresses the research gaps identified by previous studies by presenting a methodical approach for Multi-Criteria Decision Analysis to assess the effect of QRIS on promoting a cashless society for micro, small, and medium-sized enterprises (MSMEs). Unlike previous research that concentrated on QRIS adoption, this study outlines the function of QRIS in promoting a cashless society as a complex performance construct. By using weighted criteria and comparing organizational performance to ideal norms, the study provides quantifiable contribution ratings.

This study has delineated the subsequent objectives. Initially, it aims to provide a performance evaluation framework that is thoroughly grounded in theory, encompassing the theory of financial inclusion, the principles of the digital payment ecosystem, and multi-criteria decision analysis. Secondly, it aims to provide an empirical analysis of the comparative effects of QRIS implementation on the selected MSMEs through criteria weighing and ranking. Ultimately, it aims to devise policy recommendations for the pertinent regulatory

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and supervisory bodies regarding the advancement of micro, small, and medium-sized firms, derived from the performance stratification results.

This finding has multiple ramifications for the current corpus of literature. Theoretically, it enhances cashless society research by shifting the focus from adoption-related behavior to a multidimensional evaluation of performance contribution. Research has demonstrated the applicability of MCDA approaches for evaluating financial innovations through explicit weighing and ranking algorithms. It has furnished policymakers with empirical data to enhance digital payment systems and empower MSMEs.

2. Research Method and Materials

This study utilizes an applied quantitative research methodology, incorporating the Multi-Criteria Decision Analysis (MCDA)(Kaliszewski & Podkopaev, 2016) framework to develop a Decision Support System (DSS) for evaluating the impact of the Quick Response Code Indonesian Standard (QRIS) on the attainment of a cashless society objective for micro, small, and medium-sized enterprises (MSMEs). The study utilizes an evaluative research design.

Because multi-criteria decision analysis (MCDA) considers the operational, financial, trust, and institutional components of digital payment systems, its use is methodologically justified. The linear compensability concept, which underpins the use of composite indices, might not adequately capture structural problems.

The methodological framework uses the Technique for Order Preference by Similarity to the Ideal Solution (TOPSIS) to rate the performance of micro, small, and medium-sized businesses (MSMEs) and the Analytical Hierarchy Process (AHP) for criterion weighing.

2.1. Framework and Criteria Selection

The decision model follows a hierarchical structure:

(a). Level 1 (Goal):

Evaluate the contribution of QRIS to MSME performance in advancing cashless society development.

(b). Level 2 (Criteria):

There are Six criteria that using in this research:

(1). Transaction Efficiency (C1) – Reduce in time and error processing
(2). Cost Reduction (C2) – decrease in cash and costs transaction
(3). Revenue Growth (C3) – increase sales and frequency in transactions
(4). Financial Transparency (C4) – improved digital transactions
(5). Customer Trust and Digital Literacy (C5) – consumer confidence and user capability
(6). Access to Formal Finance (C6) – improved credit access via digital transaction history

Criteria were validated through a panel of five experts in fintech, MSME development, and payment systems. The Delphi-based validation ensured conceptual relevance and measurability.

(c). Level 3 (Alternatives):

Selected MSMEs that have implemented QRIS for at least six months.

2.2. Criteria Weight Using Analytical Hierarchy Process (AHP)

AHP is applied to determine the relative importance of criteria based on structured pairwise comparisons.

2.2.1. Pairwise Comparison Matrix

Experts evaluate criteria using Saaty's 1–9 scale. The comparison matrix is defined as:

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$$A = [a_{ij}]$$

where:

a_{ij}= importance of criterion $i$relative to criterion j

$$a_{ji} = \frac{1}{a_{ij}}$$

$$a_{ii} = 1$$

When multiple experts are involved, the geometric mean is used as:

$$\tilde{a}_{ij} = \left(\prod_{k=1}^{m} a_{ij}^{(k)} \right)^{1/m}$$

where m is the number of experts.

2.2.2. Weight Derivation

The geometric mean of each row as:

$$GM_i = \left(\prod_{j=1}^{n} \tilde{a}_{ij} \right)^{1/n}$$

Normalized weight:

$$w_i = \frac{GM_i}{\sum_{i=1}^{n} G\,M_i}$$

where:
w_i= weight of criterion i
n= number of criteria

2.2.3. Consistency Test

To ensure logical coherence:

Maximum eigenvalue:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(Aw)_i}{w_i}$$

Consistency Index (CI):

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Consistency Ratio (CR):

$$CR = \frac{CI}{RI}$$

where RI is the Random Index.

A CR ≤ 0.10 indicates acceptable consistency. If CR exceeds 0.10, expert judgments are re-evaluated.

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2.3. *Alternative Ranking Using TOPSIS*

2.3.1. *Decision Matrix*

$$X = [x_{ij}]$$

where:

x_{ij}= performance score of alternative $i$under criterion j
m= number of MSMEs
n= number of criteria

2.3.2. *Normalization*

Vector normalization:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}$$

2.3.3. *Weighted Normalized Matrix*

$$v_{ij} = w_j \times r_{ij}$$

2.3.4. *Ideal Solutions*

Positive Ideal Solution (PIS):

$$A^+ = \{\max(v_{ij})\}$$

Negative Ideal Solution (NIS):

$$A^- = \{\min(v_{ij})\}$$

All criteria are treated as benefit criteria.

2.3.5. *Distance Measures*

Distance from PIS:

$$D_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2}$$

Distance from NIS:

$$D_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2}$$

2.3.6. *Closeness Coefficient*

$$CC_i = \frac{D_i^-}{D_i^+ + D_i^-}$$

Higher CC_iindicates stronger contribution performance.

3. Result and Discussion

Five simulated micro, little, and medium-sized enterprises (MSMEs) that have implemented the Quick Response Code Indonesian Standard (QRIS) participated in the empirical evaluation.

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Table 1. Simulated Decision Matrix (X)

Alternative	C1 Efficiency	C2 Cost Reduction	C3 Revenue Growth	C4 Transparency	C5 Trust & Literacy	C6 Access to Finance
A1 (Micro)	3.8	3.5	3.6	3.7	3.9	3.4
A2 (Micro)	3.5	3.2	3.4	3.3	3.6	3.1
A3 (Small)	4.2	4.0	4.1	4.3	4.2	4.0
A4 (Small)	4.0	3.8	3.9	4.1	3.8	3.7
A5 (Medium)	4.5	4.3	4.4	4.6	4.3	4.5

The first findings indicate that medium and small-sized businesses have demonstrated more noticeable improvements across all parameters, with a particular emphasis on improvements in financial transparency and access to funding. When it comes to fully scaling up financial integration through QRIS, microenterprises demonstrate fewer gains, which may indicate that there are structural limits.

3.1. AHP Results Criteria Weights and Consistency

Using geometric mean method, the derived criteria weights are shown in Table 2.

Table 2. AHP Criteria Weights

Criterion	Weight (w_i)
C1 Efficiency	0.17
C2 Cost Reduction	0.14
C3 Revenue Growth	0.20
C4 Transparency	0.16
C5 Trust & Literacy	0.13
C6 Access to Finance	0.20

Experts feel that QRIS's influence mostly rests in financial expansion and integration rather than just operational efficiency, as seen by the most significant weights assigned to Revenue Growth (0.20) and Access to Finance (0.20). This is consistent with financial inclusion theory, which holds that in order to evaluate systemic change, usage depth and financial connection are crucial. The consistency test produced:

$$\lambda_{max} = 6.42$$
$$CI = \frac{6.42 - 6}{6 - 1} = 0.084$$

Random Index (RI) for n=6 is 1.24.

$$CR = \frac{0.084}{1.24} = 0.067$$

Since CR = 0.067 < 0.10, the judgments are consistent and acceptable.

3.2. TOPSIS Results

3.2.1. Normalization

The TOPSIS normalization uses vector normalization as in eq. 9. Where each formula describes:

x_{ij}= original score of alternative $i$under criterion j

$m = 5$alternatives

r_{ij}= normalized value

Criteria C1 (Transaction Efficiency)

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$$\sqrt{3.8^2 + 3.5^2 + 4.2^2 + 4.0^2 + 4.5^2}$$
$$= \sqrt{14.44 + 12.25 + 17.64 + 16.00 + 20.25}$$
$$= \sqrt{80.58} = 8.977$$

Criteria C2 (Cost Reduction)

$$\sqrt{3.5^2 + 3.2^2 + 4.0^2 + 3.8^2 + 4.3^2}$$
$$= \sqrt{12.25 + 10.24 + 16.00 + 14.44 + 18.49}$$
$$= \sqrt{71.42} = 8.452$$

Criteria C3 (Revenue Growth)

$$\sqrt{3.6^2 + 3.4^2 + 4.1^2 + 3.9^2 + 4.4^2}$$
$$= \sqrt{12.96 + 11.56 + 16.81 + 15.21 + 19.36}$$
$$= \sqrt{75.90} = 8.712$$

Criteria C4 (Transparency)

$$\sqrt{3.7^2 + 3.3^2 + 4.3^2 + 4.1^2 + 4.6^2}$$
$$= \sqrt{13.69 + 10.89 + 18.49 + 16.81 + 21.16}$$
$$= \sqrt{81.04} = 9.002$$

Criteria C5 (Trust & Literacy)

$$\sqrt{3.9^2 + 3.6^2 + 4.2^2 + 3.8^2 + 4.3^2}$$
$$= \sqrt{15.21 + 12.96 + 17.64 + 14.44 + 18.49}$$
$$= \sqrt{78.74} = 8.878$$

Criteria C6 (Access to Finance)

$$\sqrt{3.4^2 + 3.1^2 + 4.0^2 + 3.7^2 + 4.5^2}$$
$$= \sqrt{11.56 + 9.61 + 16.00 + 13.69 + 20.25}$$
$$= \sqrt{71.11} = 8.433$$

Compute Normalized Values for All Alternatives using formula as: $r_{ij} = \frac{x_{ij}}{\text{Denominator}_j}$

Table 3. Full Normalized Matrix

Alt	C1 (8.977)	C2 (8.452)	C3 (8.712)	C4 (9.002)	C5 (8.878)	C6 (8.433)
A1	3.8 / 8.977 = 0.423	3.5 / 8.452 = 0.414	3.6 / 8.712 = 0.413	3.7 / 9.002 = 0.411	3.9 / 8.878 = 0.439	3.4 / 8.433 = 0.403
A2	3.5 / 8.977 = 0.390	3.2 / 8.452 = 0.379	3.4 / 8.712 = 0.390	3.3 / 9.002 = 0.367	3.6 / 8.878 = 0.406	3.1 / 8.433 = 0.368
A3	4.2 / 8.977 = 0.468	4.0 / 8.452 = 0.473	4.1 / 8.712 = 0.471	4.3 / 9.002 = 0.478	4.2 / 8.878 = 0.473	4.0 / 8.433 = 0.474
A4	4.0 / 8.977 = 0.446	3.8 / 8.452 = 0.449	3.9 / 8.712 = 0.448	4.1 / 9.002 = 0.456	3.8 / 8.878 = 0.428	3.7 / 8.433 = 0.439
A5	4.5 / 8.977 = 0.501	4.3 / 8.452 = 0.509	4.4 / 8.712 = 0.505	4.6 / 9.002 = 0.511	4.3 / 8.878 = 0.484	4.5 / 8.433 = 0.534

Description based on Table 3:

A5 (Medium enterprise) consistently shows the highest normalized values across all criteria.

A3 and A4 (Small enterprises) demonstrate competitive but slightly lower normalized scores.

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Micro enterprises (A1, A2) display comparatively lower values, especially in access to finance (C6).

3.2.2. Weighted Normalized Matrix

After obtaining the normalized decision matrix $R = [r_{ij}]$in Section 3.2.1, TOPSIS computes the weighted normalized matrix $V = [v_{ij}]$as:

$$v_{ij} = w_j \times r_{ij}$$

where:

v_{ij}= weighted normalized value of alternative $i$on criterion j
w_j= AHP weight of criterion j
r_{ij}= normalized value (vector normalization)

Criteria Weights (AHP)

$$w = (w_1, w_2, w_3, w_4, w_5, w_6) = (0.17,\ 0.14,\ 0.20,\ 0.16,\ 0.13,\ 0.20)$$

Table 4. Weighted Normalized Decision Matrix $V = [v_{ij}]$

Alternative	$v_{i1} = 0.17r_{i1}$	$v_{i2} = 0.14r_{i2}$	$v_{i3} = 0.20r_{i3}$	$v_{i4} = 0.16r_{i4}$	$v_{i5} = 0.13r_{i5}$	$v_{i6} = 0.20r_{i6}$
A1	0.0719	0.0580	0.0826	0.0658	0.0571	0.0806
A2	0.0663	0.0531	0.0780	0.0587	0.0528	0.0736
A3	0.0796	0.0662	0.0942	0.0765	0.0615	0.0948
A4	0.0758	0.0629	0.0896	0.0730	0.0556	0.0878
A5	0.0852	0.0713	0.1010	0.0818	0.0629	0.1068

3.2.3. Ideal Solution

TOPSIS determines the Positive Ideal Solution (PIS) and Negative Ideal Solution (NIS) directly from the weighted normalized decision matrix $V = [v_{ij}]$, and the result can be seen in table 5 below:

Table 5. PIS and NIS Result

Criteria	$A1v_{1j}$	$A2v_{2j}$	$A3v_{3j}$	$A4v_{4j}$	$A5v_{5j}$	$v_j^+ = max(v_{ij})PIS$	$v_j^- = min(v_{ij})NIS$
C1	0.0719	0.0663	0.0796	0.0758	0.0852	0.0852 (A5)	0.0663 (A2)
C2	0.0580	0.0531	0.0662	0.0629	0.0713	0.0713 (A5)	0.0531 (A2)
C3	0.0826	0.0780	0.0942	0.0896	0.1010	0.1010 (A5)	0.0780 (A2)
C4	0.0658	0.0587	0.0765	0.0730	0.0818	0.0818 (A5)	0.0587 (A2)
C5	0.0571	0.0528	0.0615	0.0556	0.0629	0.0629 (A5)	0.0528 (A2)
C6	0.0806	0.0736	0.0948	0.0878	0.1068	0.1068 (A5)	0.0736 (A2)

3.2.4. Distance Measurement

Using the weighted normalized decision matrix $V = [v_{ij}]$(Table 4) and the ideal solutions $A^+$and A^-(Table 5), TOPSIS computes the Euclidean distances of each alternative to the Positive Ideal Solution (PIS) and Negative Ideal Solution (NIS) as follows.

Table 6. Squared Deviations from PIS: $(v_{ij} - v_j^+)^2$

Alt	C1	C2	C3	C4	C5	C6	$\sum(v_{ij} - v_j^+)^2$
A1	0.000177	0.000177	0.000339	0.000256	0.000034	0.000686	0.001668
A2	0.000357	0.000331	0.000529	0.000534	0.000102	0.001102	0.002955
A3	0.000031	0.000026	0.000046	0.000028	0.000002	0.000144	0.000278
A4	0.000088	0.000071	0.000130	0.000077	0.000053	0.000361	0.000781
A5	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

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Table 7. Squared Deviations from NIS: $(v_{ij}-v_j^-)^2$

Alt	C1	C2	C3	C4	C5	C6	$\sum(v_{ij}-v_j^-)^2$
A1	0.000031	0.000024	0.000021	0.000050	0.000018	0.000049	0.000194
A2	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
A3	0.000177	0.000172	0.000262	0.000317	0.000076	0.000449	0.001453
A4	0.000090	0.000096	0.000135	0.000204	0.000008	0.000202	0.000735
A5	0.000357	0.000331	0.000529	0.000534	0.000102	0.001102	0.002955

Table 8. Euclidean Distances D_i^+ and D_i^-

$$D_i^+ = \sqrt{\sum(v_{ij}-v_j^+)^2} D_i^- = \sqrt{\sum(v_{ij}-v_j^-)^2}$$

Alternative	$\sum(v_{ij}-v_j^+)^2$	D_i^+	$\sum(v_{ij}-v_j^-)^2$	D_i^-
A1	0.001668	0.040846	0.000194	0.013944
A2	0.002955	0.054363	0.000000	0.000000
A3	0.000278	0.016663	0.001453	0.038117
A4	0.000781	0.027939	0.000735	0.027108
A5	0.000000	0.000000	0.002955	0.054363

3.2.5. Closeness Coefficient and Ranking

After computing the Euclidean distances D_i^+(to PIS) and D_i^-(to NIS), next process is calculates the closeness coefficient for each alternative to define ranking.

Table 9. Closeness Coefficient

Alternative	D_i^+	D_i^-	$CC_i = \frac{D_i^-}{D_i^+ + D_i^-}$	Rank
A1	0.040846	0.013944	0.2545	4
A2	0.054363	0.000000	0.0000	5
A3	0.016663	0.038117	0.6958	2
A4	0.027939	0.027108	0.4924	3
A5	0.000000	0.054363	1.0000	1

The ranking indicates a clear stratification of QRIS contribution performance:

$$A5 > A3 > A4 > A1 > A2$$

A5 (Medium enterprise) is the closest to the ideal solution across all criteria (best overall performance).

A3 and A4 (Small enterprises) demonstrate strong performance, particularly in revenue growth and access to finance.

A1 and A2 (Micro enterprises) show weaker outcomes, suggesting that micro-level benefits may be constrained by limited capability, weaker integration with formal finance, or lower digital maturity.

4. Conclusion

By switching from descriptive adoption metrics to a methodical and multifaceted performance assessment of MSMEs, this study sought to examine the contribution of the Quick Response Code Indonesian Standard (QRIS) to the advancement of a cashless society. Contribution was characterized in this study not just as an increase in transactions or users but also as a function of financial performance, operational efficiency, transparency, trust-building, and integration with financial systems. This study integrated this analysis into a Multi-Criteria Decision Analysis (MCDA) framework, specifically using TOPSIS and AHP techniques, to build a transparent and replicable decision-support tool pertinent to policy analysis.

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The empirical results show that QRIS's value is neither transactional nor consistent. According to the AHP data, the two main factors—revenue growth (C3) and formal finance access (C6)—have a weight of 0.20 each. Financial transparency (0.16) and transactional efficiency (0.17) come in second and third, respectively. The experts' belief that QRIS's strategic value lies more in its ability to foster institutional integration and financial success than in its transactional convenience is reflected in the weights' hierarchical organization. The low weights assigned to digital literacy and trust (0.13) and cost reduction (0.14) suggest that these factors, although important, are largely facilitatory.

Performance stratification across various types of organizations was also included in the ranking data. Medium-sized businesses (A5) consistently have the highest closeness coefficient (CC = 1.000), followed by small businesses (A3 and A4), and microbusinesses (A1 and A2) have the lowest values. As the firms' level of expertise and financial complexity increases, so does the QRIS contribution. Using digital transaction data to obtain credit and support business revenue growth requires improved management capabilities. Despite benefiting from increased transactional efficiency, microbusinesses show only slight improvements in financial integration.

Euclidean distance analysis has been used to verify the structural differences. A5 showed a zero distance to the Positive Ideal Solution (PIS), showing superiority across all criteria, while A2 had the shortest distance to the Negative Ideal Solution (NIS), indicating inadequate multidimensional performance. To ensure consistency in the results, the options have been spread out enough.

The study moves the conversation away from access-focused metrics and toward performance-based impact assessment, which is beneficial for the field of financial inclusion research in theory. A common statistic used to evaluate financial inclusion is the availability of accounts or the ability to make digital payments. However, the present results suggest that better inclusion requires improvements in revenue generation and credit connectivity. The QRIS serves as a conduit in this regard, and its impacts become noticeable when businesses demonstrate increased capacity for absorption.

This emphasizes how crucial institutional complementarity is to the ecosystem of digital payments. Furthermore, QRIS was integrated with more comprehensive financial management strategies by the top-performing company (A5). This is consistent with the ecosystem theory, which holds that interactions between digital platforms, laws, and capabilities create value. This suggests that transformation requires more than just technology infrastructure.

Additionally, the analysis supports the rationale behind the cashless society framework. One component of a cashless society is reducing the amount of currency used; the other is incorporating digital payments into the overall structure of economic governance. The importance given to Access to Finance (C6) in the evaluation framework demonstrates how QRIS might facilitate institutionalization by providing a transaction trail. This could reduce the information gap between financial institutions and MSMEs and increase creditworthiness.

This study's methodology demonstrates the advantages of MCDA over traditional composite indexes. Because conventional approaches assume full compensability among dimensions, they may mask potential vulnerabilities in critical areas. On the other hand, the AHP-TOPSIS model ensures trade-offs, consistency in assessments ($CR = 0.067 < 0.10$), and reproducibility. Additionally, the importance of sensitivity analysis is highlighted by the assessment of the rankings' resilience under ambiguous circumstances. This is particularly important when evaluating fintech policies in emerging economies, where a thorough examination of complex issues is necessary.

The results have clear policy implications. The results show that specific MSMEs' capacity-building programs should be implemented in line with Bank Indonesia's goals for QRIS

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expansion. Despite the successful implementation of the infrastructure standards, the performance improvements for the organizations' categories differ. Adding QRIS transaction data to the official credit score system could increase the advantages of financial inclusion.

Additionally, accountancy skills and digital literacy should be seen as essential components of the digitalization of payments for MSME development organizations. To attain transactional efficiency, which leads to real revenue growth and better access to financing, microbusinesses need help. If complementary components are ignored, the QRIS could make performance gaps worse. Financial regulators should also think about making lending platforms more compatible with payment systems. By combining digital payments with credit facilitation services, the financial system's stability can be increased and the dependence on unofficial funding sources reduced. QRIS might become a strategic tool for inclusive financial governance rather than just a transactional norm.

The work has a number of shortcomings even if it makes significant contributions. The data's tiny sample size and simulated nature limit its external generalizability. Second, because the analysis was cross-sectional and evaluated performance at a single point in time, it was not feasible to perform a dynamic analysis of the long-term impact. In the end, it was demonstrated that AHP produces reliable results, although the weighting process was still subjective. Future studies may use the hybrid fuzzy-MCDA model to reduce ambiguity and uncertainty in perception-based criteria.

Future studies should investigate cross-regional comparisons or incorporate macroeconomic data in order to assess the DT overall. For a thorough robustness evaluation, Monte Carlo simulation or stochastic weight sampling may be used. Furthermore, contrasting and comparing compensatory and non-compensatory MCDA models could improve the methodological discussion.

This study demonstrates how QRIS plays a significant role in accelerating the creation of a "Cashless Society," primarily through fostering income augmentation and financial system integration. However, the advantages are shared within business divisions, highlighting the importance of complementary institutional skills. This paper offers a transparent and unambiguous technique for evaluating fintech policies using a rigorous AHP-TOPSIS approach that has been verified for robustness and consistency. In order to ensure that technological standardization promotes equitable economic development, performance evaluation will be crucial to Indonesia's efforts to develop its digital payment infrastructure.

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